



IUPAC

Information Bulletin

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INTERNATIONAL UNION OF PURE and APPLIED CHEMISTRY

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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, nongovernmental, nonprofit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

to promote continuing cooperation among the chemists of the member countries;

to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;

to cooperate with other international organizations which deal with topics of a chemical nature;

to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 42 countries, each represented by a national organization, such as an academy of science or research council.

IUPAC INFORMATION BULLETIN

The Bulletin provides a news medium for the various activities of IUPAC, especially of its 60 or so committees. It carries advance information on forthcoming symposia which are to be sponsored by IUPAC together with reports of such meetings which have recently taken place. Coverage is also given to projects in which IUPAC is collaborating with other international organizations.

With effect from 1978 the deliberations of the biennial IUPAC Council meetings will be included in the Bulletin and not be published separately in Comptes Rendus form. Provisional recommendations on nomenclature, symbols, terminology, and conventions, which were issued previously as Appendixes will also be incorporated into the Bulletin for 1978 onwards.

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29TH IUPAC GENERAL ASSEMBLY

COMPTES RENDUS 29TH IUPAC COUNCIL MEETING

Warsaw, Poland: 19 and 21 August 1977

OFFICIAL DELEGATES OF NATIONAL ADHERING ORGANIZATIONS*

Arab Republic of Egypt (4 votes)

Prof. A. ABOU-EL-AZM, Academy of Scientific Research and Technology, 101 Kasr El Eini Street, Cairo, Arab Republic of Egypt (Leader of Delegation; also Bureau Member)

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Dr. M. S. E. EL-SEWEFFI, Egyptian Co. for Refractories, 23 Talat Harb Street, Cairo, Arab Republic of Egypt

Argentina (4 votes)

Australia (4 votes)

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Dr. J. E. LANE, Division of Applied Organic Chemistry, Commonwealth Scientific and Industrial Research Organization, POB 4331, Melbourne, Victoria, Australia 3001

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Austria (2 votes)

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Belgium (4 votes)

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Brazil (No voting rights: 1976 subscription outstanding)

Bulgaria (2 votes)

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Dr. O. PESHEV, Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, Sofia 1000, Bulgaria

Canada (6 votes)

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Colombia (2 votes)

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*Unless he is also an Official Delegate from a National Adhering Organization, a Bureau Member is not entitled to vote at a meeting of Council. A Secretary to a delegation is not entitled to vote.

Czechoslovakia (4 votes)

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Israel (4 votes)

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Turkey (No voting rights: Category D membership)

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Yugoslavia (2 votes)

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European Federation of Chemical Engineering

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*These Delegates have the status of Observer and they are not entitled to vote.

European Photochemistry Association

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AGENDA FOR 29TH IUPAC COUNCIL MEETING

1. Introductory Remarks and Finalization of Agenda
2. Approval of Minutes of 28th Council Meeting
3. Announcement of Nominations for Officers and Bureau Members
4. Announcement of Time of Elections
5. Statutory Report of President on State of the Union
6. Biennial Report of Treasurer
7. Report of Finance Committee
8. Tentative Budgets for 1978 and 1979
9. Dues Structure and Fixing Annual Dues for 1978 and 1979
10. Applications for Membership of IUPAC
11. Applications for Associated Organization Status
12. Reports of Division Presidents and Clinical Chemistry Section
13. Report of Committee on Publications
14. Report on CHEMRAWN Activities
15. Proposals Formally Received from National Bodies
16. Adoption of Nomenclature Recommendations
17. Proposals for New Bodies and Dissolution of Existing Bodies
18. Ratification of Decisions taken by Bureau and Executive Committee since 28th Conference
19. Important Matters Discussed by Bureau at 29th General Assembly Not Covered by Items on Council Agenda
20. Elections
21. Ratification of Dates and Place of 30th General Assembly and 27th Congress
22. Place of 31st General Assembly and 28th Congress
23. Any Other Business (Discussion only)

REPORT OF PRESIDENT ON STATE OF THE UNION

IUPAC 1975-7

I must speak first on the future of the Union.

The future well-being of the Union is for the first time critical to the fulfilment of essential world needs – in the past, we have prided ourselves on the fulfilment of the needs of world scientists. Now the world has advanced to such a stage of development that science is an essential component part of the world

structure along with politics, law, economics, and other human factors; in fact, science seems to stand alone as the arbiter and exponent of human survival.

Let us consider some of the evidence for this monumental change. Many centuries ago, NEWTON observed certain fundamentals: gravity, mass and conservation principles. More recently, DARWIN observed a natural progression in regard to *The Origin of Species* and *The Descent of Man*; still later, we came to the MALTHUSIAN hypothesis on the availability of food as a natural limitation on population growth – a braking effect on the otherwise unlimited procreation of the human species. In recent times, EINSTEIN discovered the equivalence of mass and energy, in the event of a suitable conversion process. All of these were *observations* of Nature. Man has essentially *no* creative competence, only powers of observation. We may doubt the existence of God as a reasoning entity, but humankind has certainly not invaded his realm (Thank God for that!).

Now to more mundane things. We have, as chemists, an essential role to play in this world drama. Proceeding on an assumption of unlimited resources in minerals, food, land, and energy, the world has in the past been tugged and twisted by all sorts of competitive interests, hence politics and law could be a predominant force. But with the recognition of finite limits to all resources vital to life and happiness, and the growing scarcity of some of those resources, the future must rest with science. Nothing material is perishable (except for the energy conversion) hence we must conserve and recycle. The biosphere is limited; food, clothing and shelter determine our survival in many critical ways; the identification of these ways and their resolution are almost entirely in the realm of science. Without science, life becomes a competitive hacking – who has the best, the ultimate weapons in the struggle for food, for example?

Certainly, if we chose *man* as of central importance, then chemistry as a science is an essential part of this philosophy – in fact, the science of substances mostly needed by man. There are other sciences which are more fundamental, e.g. mathematics and physics, even astronomy. There are other sciences which are more restricted to human characteristics, e.g. biology, geography, nutrition, genetics, even psychology. But chemical science is comprehensive and all-pervasive as it brings into one arena all of our bodily needs: food, clothing and shelter in former times; now we talk about resource technology – but we are still concerned about satisfying human needs in the physical realm.

Within the structure and purposes of this Union, how can we adapt to this gross change that we detect in the physical world? How can we shift from the comfortable guidance of 'unlimited' resources for our enjoyment to the critical severity of resource limitations?

Science is great because it aggrandizes man. Politics is tawdry because it belittles. In between is bureaucracy which mediocratizes (if there is such a word).

I opt for ennoblement, and let's keep that image plain. *What are the qualities which we scientists choose to represent?*

First, *inevitability*. Nothing is false; we deal only with the inexorable facts of Nature.

Second, *timelessness*. No age in science differs from any other. Even the processes of growth and decay are guided by unchanging laws.

Third, *universality*. There are no boundaries, physical or otherwise, to the laws and realm of science.

Finally, *significance*. No contribution of humanity can possibly transcend science—not even religion which treats of aspirations that must rest on natural laws for accomplishments, even as to the emotions and inspirations of individual humans.

I think we are very fortunate indeed to be humans at this time in world history, also to be scientists, and also to be Titular Members of IUPAC. But what do we owe to the rest of the world in this fortunate trilogy? Will we become a triptych to be excavated in a million years—or a group of men to lead the world to new heights?

These are all matters which can be related to your actions in the next few hours. Guide your purposes by the possible as you visualize it—not by the probable, nor the permissible as you may be limited by others. For the nonce, please think of yourselves as indispensable, all-knowing, and all-understanding, then make your decisions accordingly.

Speaking about the Union as it has existed for many years and on which its present fine reputation must rest, briefly there are three types of activity—(1) promotion of scientific communication; (2) achievement of worldwide uniformity in matters of nomenclature, symbols, and, in a manner of speaking, chemical science communication; and (3) reaching agreement among scientists as to how to establish a uniformity of method (such as analysis) in many laboratories of the world.

Identification of the commonness of these purposes with many intergovernmental organizations such as the UN, UNESCO, OECD, CEE, etc. has been an absolute necessity in the past. However, due to increasing political pressures and increasing bureaucracy, our continued closeness with these intergovernmental organizations becomes questionable. Intergovernmental organizations are dominated, by and large, by political considerations, and we have seen how the world goes in this respect to its cold wars, its *détentes*, and its third world interactions leading to an exacerbation of old irritations.

I am convinced that in the future the private sector international organizations such as the scientific unions must bear an important part of the burden for making possible the resolution of political tensions and human needs through science and technology. Our present IUPAC linkages, financial and otherwise, with national governments cast some doubt on whether such unions can prevail over the forces of taxation and militarism.

The impact (or difference) which is perhaps strongest between the private sector and governments is that which governs the freedom of scientific communication, reducing in everyday events to the simplistics of visa approval. As you know, IUPAC has operated strongly in this field along lines laid down first by my predecessor, Sir HAROLD THOMPSON. The Union has been challenged many times by many governments but has suffered no outstanding defeats up to the present time. All countries seem to recognize that an IUPAC-sponsored meeting must be available to *all* scientists from *every* country in the world. This is a unique recognition of the value of science and the publicly accepted necessity for the freedom of scientists to attend to the business of scientific communications,

and to cross boundaries which are frequently forbidden to nationals of certain foreign nations. While this is an area of controversy, I also consider it an area of great world promise in the fact that political governments could ultimately respond to *any* pressures in this area. No other world force but science has achieved such recognition!

As to the future goals of the Union and the need for some evolutionary element, we heard first in Munich (in 1973) of the concept of a national committee toward a possible IUPAC role in sponsoring the development of chemical science toward world needs (Chemical Research Applied to World Needs or CHEMRAWN). This recurring theme, as reiterated in Madrid, has also had a special IUPAC recognition in that Sir HAROLD set up a special *ad hoc* task force which has moved strongly and with the greatest zeal toward its objectives. The critical prospects for its success rests chiefly in the personal leadership of such chemists as CHARLES OVERBERGER, BRYANT ROSSITER, WILLIAM SCHNEIDER, and MAX TISHLER. We are indeed beholden to this group for its future promise in carrying on an ambitious program for a World Conference on Future Sources of Organic Raw Materials in Toronto, Canada, 10–13 July 1978.

Although this much vaunted effort rests largely on the ambitions of the new world, we Americans are simply accepting our inherited base from the old world and must, through proper connections, produce through the tested channels of the Union the results that we eventually hope for.

Pursuing the concept of evolution of IUPAC, we note further an external suggestion posed by Nobel chemist GLENN SEABORG in his role as President of the American Chemical Society and its recent centennial celebration in New York. SEABORG described the concept of an international chemical society modeled closely on the lines of national societies but worldwide in its scope. Obviously, one thought of existing organizations such as IUPAC and the Federation of European Chemical Societies. How would the proposed international chemical society differ significantly from them?—further, could IUPAC, for example, be a starting point for the new type society?

The significant differences, as I see them, are two-fold. First, SEABORG's society would be a group organization of individual scientists, each providing some support through dues, registration fees and subscriptions, much as The Chemical Society (London) and G. D. Ch. (Federal Republic of Germany). The needs of the individuals would be served rather than the impersonal hand of government. Thus we would be free once and for all from the heavy hand of politics.

As might be expected, the existing national societies and international organizations do not look with favor on such a proposal. Financial difficulties are of course foremost in everyone's mind—how to get several thousand members, each contributing \$40 or \$50 in dues each year.

On the other hand, would it be possible for IUPAC to assume the guise of such a body and make room for individual memberships, with dues and special services in return?

Several years ago, the concept of Company Associates was initiated, with technically-minded companies offering corporate contributions through annual pay-

ments to the adhering bodies in several countries. Could something of the same type make possible individual contributions of scientists, with some factor of recognition in return? I would call such contributors Scientific Associates and, like Company Associates, cultivate their affiliation through national adhering bodies. In the years ahead, such an enlargement of our financial base might be valuable.

The Executive Committee considered my suggestion of Scientific Associates with some skepticism, and suggested the idea should be reviewed by the US National Committee at a future time, and this will be done, I am told.

Besides new resources in money, IUPAC will also need new experts, and my predecessor hit upon a scheme which he sold to the Wates Foundation in UK. For several years, 'younger' chemists have been supported to attend the meetings of the more active commissions of the Union, as guests—presumably to create a lasting interest and provide for a more youthful succession. The quality of these guests is assured by the selection of observers through the national adhering bodies. Fortunately UK has been joined by USA in this concept and both countries will be supporting these special observers of the work of commissions, with their consent, of course. No change is implied in the appointments of future commission members, but the familiarity of the visiting scientists with the important work of the commissions would be a good force toward smooth continuity.

We must be successful as a Union on the old and tested bases for fulfilling scientists' needs, if we are to sustain these special and unfamiliar efforts to fulfil world needs.

Above and beyond our future expectations, the Union has done its homework in accordance with its established goals and motivations that were carefully laid down by our latest past presidents—THOMPSON, BÉNARD, REES, KONDRATIEV, KLEMM, TODD and NOYES.

On finances, the strength of the Union rests on the base that has been in effect for many years. The major contributions come from the National Adhering Organizations (frequently the academies of science of governments), supplemented by substantial contributions from Company Associates but still funneled through the adhering bodies. We have enjoyed the strong support in planning and guidance of our Finance Committee chairmen, PHILIP ARNOLD and JACK BARRETT, and have benefitted from the tremendous strength of our esteemed Treasurer, OTTO HORN, in meeting and keeping down expenses. I have been very pleased with the supplementary guidance of an active Secretary General who has graduated from his former post of Publications Committee chairman, GUY OURISSON; also with the backup to the Executive Committee from the Bureau and Divisional Presidents. The governance of the Union is diffused because of its international character but without losing the force of action needed in the long run. We also are fortunate in the continued able support of the staff secretariat headed by Dr. MAURICE WILLIAMS and seconded by Miss ANN TROUGHTON.

You will be hearing about the work of the separate divisions shortly and I shall not try to steal their thunder except to say that their story is long, varied, and interesting.

One field which needs special mention is that of the interdivisional and international aspects of nomenclature. As you know, feelings can be very strong on nomenclature problems when experts get together. Fortunately we have had the excellent strength and leadership of bodies such as IDCNS, first from Prof. McGLASHAN and currently from KURT LOENING, who is indeed a 'man for all seasons', since he is so familiar with the different subfields of chemistry and can thus effectively bring together an all-union committee, but still seems to maintain the possible illusion of mild manners. (Maybe he really is that way!)

Beyond the Union, there are still needs for inter-union discussion and approval on the nomenclature front. One that has been of considerable importance and difficulty in recent years, as Sir HAROLD will agree, has been interaction with the International Union of Biochemistry. The achievements and frustrations of the Committee on Biochemical Nomenclature are too well known to need review.

However, I think we have achieved an equilibrium and rationalization of procedure in reestablishing the Committee on Biochemical Nomenclature as the Joint Committee on Biochemical Nomenclature, and at the same time the International Union of Biochemistry has declared itself in its own business, with its own Committee on Biochemical Nomenclature sharing its needs with those of IUPAC and at the same time fulfilling better its own needs for specialized biochemical nomenclature.

Rather than give a detailed picture of the finances for the next biennium, I shall let our Treasurer make his own report so that you can see through his eyes both the successful and the threatening aspects of our finances.

19 August 1977

R. W. CAIRNS
President

BIENNIAL REPORT OF TREASURER FOR 1975-6

The fact that in spite of continuous worldwide inflation and undiminished cost increases the finances of IUPAC during this biennial were still in fairly good order can be attributed not only to the efforts of the Treasurer, but even more so to the understanding shown by the Divisional Presidents and the support of the Finance Committee under the chairmanship of Dr. J. W. BARRETT. Since the level of income of IUPAC has remained almost constant for 3 years, but costs during this period have been rising continuously, the situation demanded a good deal of understanding and rationalization of work by all members if IUPAC's performance was not to drop to too low a level. Occasionally the Treasurer was compelled to adopt sudden economy measures if he saw unexpected costs approaching.

The efforts made to bring the activities of IUPAC into line with scientific progress and the needs of society are evident in the provision of US-\$25 000 for New and Extended Activities. Of this sum, US-\$5000 was made available to the CHEMRAWN (Chemical Research Applied to World Needs) committee for its planning work for the World Conference on Future Sources of Organic Raw Materials in July 1978 in

Toronto, the money to serve as an initial allowance and additional funds for committee meetings. Further amounts were allocated to the Committee on Teaching of Chemistry, the *ad hoc* Committee on Health and Environment and to the Divisions for special tasks. However desirable it is for funds to continue to be available in coming years for New and Extended Activities, continuously rising costs unfortunately make it impossible at present to finance these activities. However, the efforts made in this respect should not be lost sight of.

Without the unselfish activities of those concerned, which frequently also involved personal sacrifice, it would not have been possible for the work in the Divisions, Committees and Commissions to be dealt with so successfully. The higher contributions paid by the National Adhering Organizations, which most member countries now base on the level of chemical turnover, enabled the costs of IUPAC activities to be covered, even though loss of income as a result of the recession had occasionally to be accepted, e.g. in the case of the Company Associates. Regrettably, however, there are still countries which have a major chemical industry but which have still not made up their minds to gear their contribution to chemical turnover or to join the Company Associates scheme. They are less hesitant, however, when it comes to withdrawals for travelling and accommodation expenses. This is a risk to the future of IUPAC finances that should not be ignored.

The 28th IUPAC Conference held in Madrid (2–11 September 1975) passed off successfully. Our thanks are due to the Consejo Nacional de Investigaciones which during 1975 prepared and supported the 28th Conference in Madrid, as well as to a number of Spanish companies for their donations (US-\$12 273). This made it possible, even during this Conference year, for a surplus of US-\$25 519 to be achieved. When it is remembered that the Conference in Madrid cost US-\$193 094 instead of the estimated US-\$175 500 and when the increases notified in my Biennial Report for 1973–4 are taken into consideration, it would appear desirable to examine whether IUPAC Conferences can continue in future to be financed in the previous manner with reimbursement in full of travelling and accommodation expenses. Reading of Treasurers' Reports written by my predecessors shows how modest were our beginnings and what a proud organization IUPAC has since become. We shall only be able to maintain this position, however, if those who today are still not fulfilling their obligations soon pay their proper subscriptions and if the annual subscriptions are indeed paid by 30 April. Unfortunately it is always the same National Adhering Organizations that are in arrears for longer than a year and that then find difficulty in paying their arrears plus the subscription that falls due. Unfortunately this then often results in loss of voting rights.

Sincerest thanks are due to all those who have contributed to a reduction in costs, whether they are members who have waived reimbursement of expenses or companies or organizations that have foregone repayment of expenses paid on behalf of their members.

We are also greatly obliged to UNESCO, from which in the last two years we received via ICSU assistance payments of US-\$16 000 and US-\$17 500

respectively, and also to the European Economic Community.

Following our decision in Madrid to establish the registered offices of IUPAC in Zürich we shall continue to be entitled to tax exemption which in turn benefits our finances. Even if we endeavour to keep our administrative costs (IUPAC Secretariat, Oxford; Union Bank of Switzerland, Zürich) as low as possible, I am afraid we still cannot escape the cost increases that result from inflation. The fact that the administrative costs of the President, Secretary General, and Treasurer are borne by their organizations, the American Chemical Society, Comité National Français de la Chimie and Hoechst AG respectively thus deserves special recognition and we are greatly indebted to all of them. Special thanks are also due to Dr. M. WILLIAMS and Miss A. TROUGHTON and their colleagues in the Secretariat in Oxford for their excellent and helpful cooperation at all times. Thanks are also due to Mr. Th. FEHR of the Schweizerische Bankgesellschaft for his great help and willingness with regard to the financial administration.

As in the past, mention should also be made of the good cooperation between the present President Dr. ROBERT CAIRNS, the Executive Committee, the Secretariat, and the Divisional Presidents. I want, however, also to thank all members of the Committees and Commissions for the understanding they have shown if occasionally I have not been able to comply in full with their financial requests. In the annex the financial results are shown in the income and expenditure accounts, the balance sheet and the report of the auditors Neutra Treuhand, Zürich.

25 April 1977

O. HORN
Treasurer

Zürich, 5 April 1977
Lowenstrasse 56

*To the Executive Committee
International Union of Pure and Applied Chemistry
Zürich – Switzerland*

AUDITOR'S REPORT ON ACCOUNTS

Years ended 31 December 1975 and 1976

As auditors of the International Union of Pure and Applied Chemistry we have examined the accounts for the years ended 31 December 1975 and 1976 in accordance with the provisions of the law.

We have come to the conclusion that:

- the balance sheets and statements of income and expenses are in agreement with the books,
- the books of account have been properly kept,
- the financial position and the results of operations are presented in accordance with the principles of evaluation prescribed by the law and the requirement of the statutes.

As a result of our examination we recommend that the accounts submitted to you be approved.

Neutra Auditing Inc.

COMPARATIVE BALANCE SHEETS AS AT 31 DECEMBER 1975 AND 1976
(Expressed in US-Dollars)

| | Assets | | Liabilities | |
|---|-------------------------|-------------------------|-------------------------|-------------------------|
| | 1975 | 1976 | 1975 | 1976 |
| <i>Cash in Bank</i> | | | | |
| US Dollars | 34 528.02 | 26 806.39 | | 471 510.11 |
| Sterling | 6 175.00 | 12 147.00 | 445 990.68 | |
| Swiss Francs | 5 199.00 | 2 378.00 | 11 319.00 | 60 298.00 |
| German Marks | 5 623.00 | 6 204.00 | 7 451.00 | 4 301.30 |
| Zloty | 0.00 | 2 000.00 | | |
| Short Term Deposits | 35 000.00 | 145 000.00 | | |
| | | <u>194 535.39</u> | | |
| <i>Marketable Securities (at cost)</i> | 374 134.09 | 380 769.08 | | |
| <i>Transitory Assets</i> | 16 221.00 | 9 803.00 | | |
| <i>Subscriptions outstanding from National Adhering Organizations</i> | 13 400.00 | 13 800.00 | 25 519.43 | 62 798.06 |
| | <u>US-\$ 490 280.11</u> | <u>US-\$ 598 907.47</u> | <u>US-\$ 490 280.11</u> | <u>US-\$ 598 907.47</u> |

**COMPARATIVE STATEMENTS OF GENERAL INCOME AND EXPENDITURES—YEARS
ENDED 31 DECEMBER 1975 AND 1976**
(Expressed In US-Dollars)

| | Income | | Expenditure | |
|--|------------------|------------------|------------------|------------------|
| | 1975 | 1976 | 1975 | 1976 |
| <i>Subscriptions</i> | | | | |
| Current Year | 170 700.00 | 173 136.65 | | |
| Previous Years | 13 030.00 | 0.00 | | |
| Outstanding | 13 400.00 | 11 800.00 | | 800.00 |
| | 197 130.00 | 184 936.65 | | |
| <i>Company Associates</i> | | | | |
| | 63 672.33 | 59 009.61 | 6 933.68 | |
| <i>Interest and Dividends Earned</i> | | | 0.00 | |
| | 29 143.57 | 33 900.32 | 47 313.00 | |
| | | | 12 291.08 | |
| <i>Other Income</i> | | | | |
| Transfer from Contracts Account | 0.00 | 1 771.40 | | 66 537.76 |
| Transfer from Publications Account | 95.00 | | 115 541.25 | |
| Special Subvention for Madrid Conference | 12 273.99 | 5 908.11 | 0.00 | |
| | 12 368.99 | 7 679.51 | | 115 541.25 |
| <i>Subvention from UNESCO/ICSU</i> | 16 000.00 | 17 500.00 | 212 535.17 | |
| | | | 2 500.00 | 4 000.00 |
| | | | | |
| <i>Other Expenses</i> | | | | |
| Contribution to ICSU | | | 7 467.00 | 4 867.50 |
| PAC for Company Associates | | | 3 174.00 | 0.00 |
| Free Inf. Bull. & Appendices | | | 3 379.00 | 2 130.00 |
| Transfer to Publications Account | | | 0.00 | 14 323.00 |
| | | | 14 020.00 | 21 320.50 |
| <i>Exchange Differences</i> | | | 2 040.01 | 707.52 |
| <i>Committed Expenditures</i> | | | 0.00 | 31 321.00 |
| <i>Excess of Income over Expenditure</i> | | | 25 519.43 | 62 798.06 |
| | US-\$ 318 314.89 | US-\$ 303 026.09 | US-\$ 318 314.89 | US-\$ 303 026.09 |

COMPARATIVE STATEMENTS OF PUBLICATIONS INCOME AND EXPENDITURES—YEARS
ENDED 31 DECEMBER 1975 AND 1976

| (Expressed in US-Dollars) | | | |
|--|-----------|--|-----------------|
| Income | | Expenditure | |
| 1975 | 1976 | 1975 | 1976 |
| <i>Publications</i> | | | |
| Butterworths | 23 130.00 | Scientific Editors | 1 374.00 |
| Pergamon | 0.00 | Assistant Secretary and Typist | 14 623.00 |
| Elsevier | 532.00 | Purchase by Secretariat from Butterworths | 3 174.00 |
| Secretariat | 8 699.00 | Inf. Bull. & Appendices | 10 484.00 |
| Solubility Data Project | 1 954.00 | Printing | 1 890.00 |
| | 34 315.00 | Postage | 240.00 |
| | | | 2 130.00 |
| <i>PAC for Company Associates</i> | | | |
| Payments by Company Associates | 6 307.00 | Comptes Rendus | 0.00 |
| Transfer from General Purpose a/c | 3 174.00 | Reprints for Conference | 1 148.00 |
| | | Share of Secretariat Costs | 13 987.00 |
| | 9 481.00 | Solubility Data Project | 0.00 |
| | | Contributions to Revision of Nomenclature of Organic Chemistry | 0.00 |
| Free Inf. Bull. & Appendices | 3 379.00 | Miscellaneous Expenditure | 779.00 |
| Contributions to Revision of Nomenclature of Organic Chemistry | | Committed Expenditures | 0.00 |
| | | Excess of Income over Expenditure | 95.00 |
| | 0.00 | | US-\$ 47 175.00 |
| | | | US-\$ 75 585.00 |
| <i>Excess of Expenditure over Income</i> | | | |
| | | | 0.00 |

COMPARATIVE STATEMENTS OF CONTRACTS INCOME AND EXPENDITURES—YEARS
ENDED 31 DECEMBER 1975 AND 1976

| (Expressed in US-Dollars) | | | |
|-------------------------------|-----------------|---------------------------------|-----------------|
| Income | | Expenditure | |
| 1975 | 1976 | 1975 | 1976 |
| <i>UNESCO Contracts</i> | | | |
| 15 500.00 | 9 300.00 | UNESCO Contracts | 9 157.00 |
| <i>CEE Contracts</i> | | | |
| 2 000.00 | 2 640.00 | CEE Contracts | 892.00 |
| <i>Balance from last year</i> | | | |
| | 7 451.00 | Transfer to General Purpose a/c | 0.00 |
| | | Balance to next year | 7 451.00 |
| | US-\$ 17 500.00 | | US-\$ 19 391.00 |
| | | | US-\$ 17 500.00 |
| | | | US-\$ 19 391.00 |

FINANCE COMMITTEE

Report to Council

General Financial Position

At the 28th Council Meeting in Madrid during 1975 we were able to predict that the increase in National Adhering Organization basic unit of subscription agreed in 1973 together with a continued tight control of expenditure would permit some modest surplus in the biennium 1975–6. This has occurred and US-\$25 000 were made available for new and extended activities of the Union. Continued inflation inevitably increases our expenditure and unless further means are found of increasing income and/or curbing expenditure, we cannot avoid a deficit in the biennium 1977–8 about equal to the surplus in the last biennium.

Investments

Investment income has been maintained at around the US-\$32 000 first achieved in 1974 and we are reasonably confident that this will continue through the next biennium. Some minor changes in our investment pattern have been made to ensure that this happens.

Subscriptions from National Adhering Organizations

The response to the higher subscription rates for National Adhering Organizations agreed in 1973 was somewhat more rapid than forecast. However, there are still several countries which have yet to move to membership categories appropriate to their national chemical turnovers. Much of our time has been spent on examining the alternative means of increasing income and the Bureau will be advised to recommend that one or more such means be adopted at the 29th Council Meeting.

Income from Company Associates

The withdrawal in 1976 of the privilege for Company Associates to receive *Pure and Applied Chemistry* at half-price distorts the apparent income from this source; a slight real increase has in fact occurred. Entry into the scheme by the Arab Republic of Egypt and more recently by Denmark is particularly welcome.

Format of Accounts

We have been striving to improve the presentation of accounts and direct your attention to the 1975–6 accounts which include for the first time sub-accounts for publications and for contracts. Unfortunately, the full advantage of the former is not yet apparent because the recent change in IUPAC's official publisher makes yearly comparisons impossible for the present.

Membership

During the biennium Dr. W. GRAULICH (Federal Republic of Germany), Prof. J. MATHIEU (France) and Dr. B. W. ROSSITER (USA) have replaced Dr. E. M. BEAVERS (USA), Mr. J. BROCARD (France) and Dr. K. HOSHINO (Japan). Dr. J. W. BARRETT (UK), Prof. A. BJÖRKMÄN (Denmark) and Prof.

G. E. ZAIKOV (USSR) have continued to serve as Members with Prof. O. HORN, IUPAC Treasurer, an *ex officio* Member and Dr. M. WILLIAMS as Secretary.

8 May 1977

J. W. BARRETT
Chairman, Finance Committee

I. PHYSICAL CHEMISTRY DIVISION

Report of President

All six Commissions of the Physical Chemistry Division have fulfilled the main items of their programmes outlined at the 28th IUPAC Conference (Madrid, 1975) and the Division has continued to play its role in the stimulation of international collaboration in physical chemistry through support of international conferences. It has accepted responsibility for IUPAC liaison with the (IUB-IUPAB-IUPAC) Inter-Union Commission on Biothermodynamics and with the International Committee for the Science of Photography which has been accredited an Associated Organization of IUPAC.

Commission I.1: Physicochemical Symbols, Terminology, and Units

This Commission is concerned with continuing problems of symbolism and terminology in physical chemistry and works in close liaison with the other Commissions of the Division. It will meet jointly with Commissions I.2 and I.6 at Warsaw and also with the Commission on Quantities and Units of the Section on Clinical Chemistry and with the Inter-Union Commission on Biothermodynamics. The partitioning of responsibility between Commission I.1 and the IDCNS has clarified considerably. The Physical Chemistry Division refers all documents involving symbols, terminology, and units to Commission I.1 for vetting before submitting them to the Secretariat. Commission I.1 thus acts for the Physical Chemistry Division on behalf of IDCNS for internal matters within the Union. The Physical Chemistry Division is concerned about the proliferation and lack of consistency in the use of acronyms and initialled abbreviations and Commission I.1 and IDCNS share responsibility in this area.

Provisional specifications on *Expressions of Results in Quantum Chemistry* (Provisional Nomenclature Appendix No. 49 to *Inf. Bull.*) should receive final approval for publication in *Pure and Applied Chemistry (PAC)* at Warsaw.

Commission I.2: Thermodynamics and Thermochemistry

Commission I.2 has organized the 'Fifth International Conference on Chemical Thermodynamics' which will be held at Ronneby, Sweden on 23–26 August 1977. At the Conference it will meet jointly with the CODATA Task Group of Key Values for Thermodynamics and with the CODATA Task Group on Internationalization and Systematization of Data.

Recommendations on *Thermodynamics Symbols and Nomenclature* have been prepared in draft form as an Appendix to the *IUPAC Manual of Symbols and*

Terminology for Physicochemical Quantities and Units. This is expected to be completed at Warsaw.

Experimental Chemical Thermodynamics, Volume I has received IUPAC approval for publication and is now ready to go to print. This definitive volume deals with Combustion Calorimetry and is the first of a series.

Subcommittee I.2.1 on Plasma Chemistry held an International Symposium in Rome in September 1975 and a similar symposium is to be held at Limoges on 13–19 July 1977. This subcommittee has prepared a draft of the first of a series of planned reports: *First Report on Spectroscopic Methods of Temperature Measurement*. This is currently being reviewed by Commission I.1 with respect to symbolism and nomenclature prior to approval for publication.

Subcommittee I.2.2 on Thermodynamic Tables continues to make good progress with its Thermodynamic Tables Project. The volume on *Carbon Dioxide* has been published this year. This is the third volume of the series, following *Argon* (1971) and *Ethylene* (1972). The volume on *Helium* is in press. Volumes on *Methane* and *Nitrogen* are in an advanced state of production and work on *Propene*, *Ethane*, *Ammonia*, *Hydrogen*, *Propane*, *Krypton*, *Xenon* are in progress. An initial survey has been made on the state of thermodynamic data for the halogenated hydrocarbons.

This subcommittee is also making progress with its *Guide to the Correlation of Thermodynamic Data* and intends to start work on *Transport Properties of Fluids*; the latter will be accelerated following the recent addition of Prof. J. KESTIN of Brown University, Providence, Rhode Island, USA to the subcommittee.

Commission I.3: Electrochemistry

This Commission met at Zürich in August 1976 in connection with the International Symposium on Electrochemistry. A Report on *Electrode Reaction Orders, Transfer Coefficients and Rate Constants* is ready for submission as a Provisional Nomenclature Appendix at Warsaw. It is planned as an Appendix to the IUPAC Manual to amplify definitions and recommendations for publication of parameters relevant to electrode kinetics. A companion document on *Transport Phenomena in Electrochemical Systems* should also be completed as a Provisional Nomenclature Appendix at Warsaw. Bibliographic data are being collected and computer programs written to process, select, classify list and access information on conductance data. An operational compilation will be available at Warsaw.

Commissions I.3 and I.6 have jointly prepared a report on the *Surface Chemistry and Physics of Solids*. Representatives of Commissions I.3 and V.5 met in Paris in July 1976 to discuss areas of common interest; this was a consequence of a movement for closer collaboration between the two Commissions initiated at Madrid.

Prof. E. YEAGER resigned as a Titular Member of Commission I.3 and Prof. A. BARD of the University of Austin, Texas, USA was appointed to replace him.

Commission I.4: Physicochemical Measurements and Standards

This Commission has completed *Physicochemical Measurements: Catalogue of Reference Materials from National Laboratories* which will appear soon in *PAC*. A new table of the vapor pressure of water has been completed and will be incorporated in the report on pressure, volume and temperature relationships in preparation by the subcommittee as noted below. Commission I.4 has established liaison with the Organization Internationale de Métrologie Légale (OIML).

Subcommittee I.4.1 on Calibration and Test Materials is concerned with the publication of a series of *Recommendations on Calibration and Test Materials*. Since the Madrid Conference sections have been published in *PAC* on *Density* and on *Molecular Weight*, and sections are in press on *Optical Absorbance and Wavelength* and on *Pressure-Volume-Temperature Relations*. Sections on *pH* and on *Reflectance*, on *Electrical Conductivity*, and on *Permittivity* are being prepared for press. Sections on *Vapour-Liquid Equilibria for Testing Distillation Columns* and on *Thermal Conductivity* are nearly completed. Sections on *Viscosity*, *Hygrometry*, *Temperature*, and *Pressure* are in process of draft revision.

The membership of this subcommittee overlaps extensively with that of the main Commission. Six of the Titular Members serve also on the subcommittee and it is difficult to draw a sharp differentiation between the contributions of the two. The subcommittee structure provides, in this instance, an effective method of bringing into the project additional experts in particular areas of specialization.

Commission I.5: Molecular Structure and Spectroscopy

Provisional recommendations on (a) *Presentation of Infrared Absorption Spectra in Data Collections* (b) *Definition and Symbolism of Molecular Force Constants* (Provisional Nomenclature Appendices Nos. 50 and 56 to *Inf. Bull.*) have been published and are expected to be approved for final publication at Warsaw.

Commission I.5 initiated discussion at Madrid concerning the proliferation of acronyms and initialled abbreviations in chemical spectroscopy. Subsequently this has been broadened to embrace all phases of physical chemistry in cooperation with Commission I.1 and the IDCNS, using spectroscopy as an area of illustration.

Subcommittee I.5.1 on Infrared and Raman Spectroscopy has completed the Second Edition of *Tables of Wavenumbers for the Calibration of Infrared Spectrometers*. The book should be available soon from Pergamon Press. This subcommittee is also preparing new *Recommendations for the Standardization of the Nomenclature of Raman Spectroscopy*. This reflects the rapid developments in this branch of spectroscopy consequent on the introduction of laser sources. These Provisional Recommendations should be completed at Warsaw.

Subcommittee I.5.2 on Storage and Retrieval of Spectral Data has a draft document on *Specifications*

for *Infrared Reference Spectra of Materials in the Vapor Phase Above the Ambient Temperature*. This is a joint project with Subcommittee I.5.1 with input from the Coblenz Society. This subject has become important because of the increasing use of infrared spectroscopy to identify fractions generated during gas chromatography. These specifications will be the first in the field of chemical spectroscopy to have provision for the storage of the spectral data in computer readable format on magnetic tape. They will include specifications for the standardization of identifying information on the lead sections of the data tape. This will have implications also for other areas of spectroscopy. It is anticipated that draft specifications will be completed at Warsaw.

Subcommittee I.5.3 on Mass Spectroscopy has completed review of the provisional recommendations on *Symbolism and Nomenclature for Mass Spectroscopy* (Provisional Nomenclature Appendix No. 51 to *Inf. Bull.*). Translations have been made into French and Italian and the final specifications should be approved for publication in *PAC* at Warsaw.

Subcommittee I.5.4 on Optical Rotatory Dispersion and Circular Dichroism was established at Madrid with Prof. W. KLYNE as Chairman. The group met at Freiburg i. Breisgau in September 1976. It is preparing draft documents on units and symbolism in this field. A project on the calibration and standardization of instruments has also been initiated. Other areas under review are (a) Magnetic Circular Dichroism, (b) Circular Dichroism in Emission, (c) Linear Dichroism.

Commission I.6: Colloid and Surface Chemistry

This Commission has completed *Definitions, Terminology and Symbols in Colloid and Surface Chemistry – Part II: Heterogeneous Catalysis* which was published in *Pure Appl. Chem.*, **46**, 71–90 (1976). Part I was published in *Pure Appl. Chem.*, **31**, 579–638 (1972). They constitute an Appendix to the IUPAC Manual and represent the culmination of an eight year project.

Reporting Experimental Data dealing with Critical Micellization Concentrations (c.m.c.'s) and Selected Definitions, Terminology and Symbols for Rheological Properties were published as Provisional Nomenclature Appendices Nos. 52 and 57 (to *Inf. Bull.*) and should be finalized at Warsaw.

A draft document on *Reporting Experimental Data Dealing with Adsorption from Solution* has been completed and a revised manual concerning *Nomenclature for Zeolites* is ready for final action at Warsaw.

An *ad hoc* subcommittee has been set up under the Chairmanship of Prof. D. H. EVERETT to implement the request of the International Company Associates Group (ICAG) that IUPAC should stimulate action concerning the correlation of catalyst activity and structure. This group will meet at Warsaw immediately prior to the General Assembly and it expects to have a report for consideration at the Joint Meeting of the ICAG with the Division Presidents. Related to this subject, but not at present integral to it, is the project to promote the preparation of standard reference catalysts. Other work in progress concerns nomenclature recommendations on (a) Light Scattering, (b) Adsorption of Gases, (c) Surface Area Measurements,

(d) Trough Experiments. Draft documents on these topics will be discussed at Warsaw.

All six Commissions have on-going programs and I recommend that their continuation be approved.

14 June 1977

R. N. JONES
President, Physical Chemistry Division

II. INORGANIC CHEMISTRY DIVISION

Report of President

This Division has three Commissions, i.e. on Atomic Weights (II.1), on Nomenclature of Inorganic Chemistry (II.2) and on High Temperatures and Refractory Materials (II.3). The important work carried out by these Commissions is very heavy and can hardly be done by correspondence, so that meetings must be kept also in the non-conference years. This imposes a heavy weight to the budget of the Division and, giving the financial limitations which have already imposed some restrictions, it prevents an increase of the number of Commissions in the Division. Obviously, all the Commissions should be allowed to continue in existence.

Commission II.1: Atomic Weights

The International Mass Spectrometric Evaluation Group (IMSEG), formed at the XXVII IUPAC Conference by the Commission II.1 on Atomic Weights, was reshaped after the 28th IUPAC Conference in Madrid, as the Subcommittee for Assessment of Isotopic Composition (SAIC). SAIC held a full meeting in Saclay (France) in August 1976, during which errors in the table of isotopic abundance, from the 1975 Atomic Weights Report, were corrected and the table re-evaluated for the presentation at the 29th IUPAC General Assembly in Warsaw.

An evaluation of the variations of isotopic composition has also been prepared which affects both the recommendation of SAIC as well as the footnotes to the atomic weight values in the Commission's Report. Important new atomic weights, data published after the Madrid meeting have been reviewed and are to be discussed at the Warsaw meeting by the Commission. Following the provisional IUPAC recommendation for systematic names of elements of atomic number higher than 101, the evaluation of atomic weights of elements 104 through 107 has been made. The Commission has much considered the implications arising from the increasing use of isotopically altered chemicals, which poses a growing threat to good practice and reliability of chemical science and technology.

The Commission has also been discussing, by correspondence, the consequences of the new definition of atomic weights, proposed in Madrid, and their major task at the Warsaw meeting will be to adopt the new definition and make clear its implications to other commissions.

Commission II.2: Nomenclature of Inorganic Chemistry

The Commission, after a meeting held in Paris in 1976, has published a provisional nomenclature for the naming of elements of atomic numbers greater than 105 [Provisional Nomenclature Appendix No. 55 (December 1976) to *Inf. Bull.*]. Comments on this nomenclature so far received are mainly favourable. The document *How to Name an Inorganic Substance*, a guide to the use of *Nomenclature of Inorganic Chemistry* (The Red Book) has also been published, by Pergamon Press.

The document on the nomenclature of hydrides of nitrogen and derived cations, anions and ligands was approved, but its publication has been deferred until after the Warsaw meeting. The document on isotopically modified compounds, which will form a new chapter in a future revised version of The Red Book, is approaching its final stages.

Important topics of inorganic nomenclature in the early stages of development were discussed and carried into the Commission's future programme with the appointment of Working Parties or individuals, to prepare documents on the following topics for the Warsaw meeting in 1977. The most important topics are the following: (i) Designation of coordinating sites in ligands; (ii) Extension of coordination nomenclature to non-metallic compounds; (iii) Nomenclature of cluster compounds (triangulated polyhedra and close polyhedral skeletons); (iv) Boron nomenclature; (v) Ring and chain nomenclature; (vi) Three dimensional heteropolyacid nomenclature; (vii) 'io' Nomenclature; (viii) Nomenclature of coordination stereoisomers; (ix) Nomenclature of inorganic polymers.

Commission II.3: High Temperatures and Refractory Materials

The Commission on High Temperatures and Refractory materials has completed the study on the melting points of Al_2O_3 and Y_2O_3 and new studies were initiated on eutectic points in metal-carbon systems and on melting points of other refractory oxides. The Commission has succeeded in obtaining the collaboration of ten laboratories in various parts of the world, and has gathered materials from four different sources (USA, Czechoslovakia, Federal Republic of Germany and Australia) for an international collaborative study on solid electrolytes and on reference electrodes for solid state electrochemistry.

The international 'Collaborative Study on Carbon Materials' has now been completed and a new task force on the 'Characterization and Terminology for Carbon Materials' is carrying on this work, with the collaboration of a number of national 'Carbon Groups'. Work at even higher temperatures that have recently been considered adequate, i.e. greater than 2000°C , will probably concern the Commission more and more as the demands of technology raise the need for information.

The Commission has always been very active in seeking out those parts of pure and applied chemistry where IUPAC can make a significant contribution in the field of standardization and characterization in High Temperature Systems. As a result of these efforts and of the work of individual members, the Commis-

sion now holds an enviable position as an innovator and as a centre for international collaboration in the high temperature technology, which should be actively pursued as a major endeavour.

4 July 1974

L. MALATESTA

III. ORGANIC CHEMISTRY DIVISION

Report of President

At the 25th Conference of IUPAC in Cortina d'Ampezzo the Committee of the Organic Chemistry Division decided that the Division should concentrate primarily on two areas of activity, namely the work of Commissions, and the organization of symposia. The first involves specialist bodies set up to investigate either problems of continuing interest to chemists or specific proposals initiated by IUPAC. The second is concerned with the organization of two types of symposia with the aim that the major developments of knowledge in organic chemistry are reflected in IUPAC gatherings of outstanding scientific standards. In our opinion this policy not only helps the dissemination of new developments in organic chemistry but also increases the prestige and public awareness of IUPAC all over the world.

The first type of these IUPAC symposia are organized, hopefully, every second year and cover broad areas of major importance to most organic chemists. The *Symposium on the Chemistry of Natural Products* has the longest tradition and was held for the tenth time in 1976 in Dunedin, New Zealand. In addition to the major purpose mentioned above it fulfilled the important need of scientists in remote areas of the world to get in personal contact with their colleagues living in centres of chemical activity such as Europe, North America and Japan. The second symposium of this group is the *IUPAC Conference on Physical Organic Chemistry*. The third conference was organized by our French colleagues in 1976 and took place in La Grande Motte near Montpellier. There are good indications that this event will become a continuing activity of our Division. The third series of symposia, namely the *Symposia on Organic Synthesis*, was already planned in 1969 but has only taken place once until now (in 1974 at Louvain-la-Neuve, Belgium). The second symposium of this series will be organized by chemists in Israel and will be held in 1978.

The second type of IUPAC symposia in organic chemistry is more specialized and takes place at more irregular intervals or only once. In 1976 we sponsored symposia on Medicinal Chemistry (in Paris), on Photochemistry (in Aix-en-Provence), on Carbohydrates (in Kyoto), on Magnetic Resonance in Biological Systems (in St. Jovite, Canada), on Low Molecular Weight Sulphur Containing Natural Products (in Jablonna, Poland), and on Drug Action at the Molecular Level (in London).

The official representatives of the President of IUPAC were asked to report to the members of the Division Committee in order that the Committee can plan further symposia in existing series or on new areas of interest for organic chemists well in advance.

The Committee also takes an active interest in the work of the Division's 4 Commissions: Two of these

are concerned with nomenclature problems, particularly of organic compounds (III.1) and organic reactions and their mechanisms (III.2). Commissions III.3 and III.4 are focal points for organic chemists working in specialized areas, namely photochemistry and medicinal chemistry. The Commission on Photochemistry includes representatives from the Physical and Inorganic Chemistry Division; it is therefore an important nucleus for interdisciplinary problems of photochemistry. Our Commission on Medicinal Chemistry has a similar position relating organic chemistry to pharmacology, medicine and clinical chemistry.

Commission III.1: Nomenclature of Organic Chemistry

Since September 1975 the extremely well organized activities of this Commission have been carried out by working parties which were active in the following areas: (i) Section E (Stereochemistry) has been published in *Pure Appl. Chem.* **45**, 11 (1976). Prof. F. VÖGTLE is in charge of a working party dealing with extensions of Section E. Section F (Natural Products and Related Compounds) has been published as Appendix No. 53 to *Inf. Bull.* in December 1976. Work on topics as appendices to Section F will be carried on by a proposed joint IUB, IUPAC, CBN Committee.

The revision of Sections A, B, C and D has been renamed in Section G (Structure-Based Systematic Substitutive Nomenclature).

A new draft for Section H (Isotopically Modified Compounds) has been prepared.

Amino acids, lipids, tetrapyrroles, carbohydrates and phosphorus-containing compounds of biochemical importance were dealt with jointly with the IUB Commission on Biochemical Nomenclature.

Other work was devoted to less conventional species such as radical ions, non-classical ions, cryptates, polydentate ligands and sulphur compounds.

Dr. K. HIRAYAMA has been nominated to fill the vacancy in titular membership created by the resignation of Prof. W. KLYNE. Four people have been invited and have accepted participation in the work of the Commission as Associate Members. The Commission was very pleased with the participation of Dr. G. P. MOSS and Dr. W. HOYLE who attended the last meeting of the Commission and who were supported by the Wates-Bursary scheme.

The new Associate Members are: Dr. D. ECKROTH (USA), Dr. J. H. FLETCHER (USA), Prof. Dr. D. HELLWINKEL (FRG), Prof. J.-C. RICHTER (Canada).

Commission III.2: Physical Organic Chemistry

The preliminary proposals of this Commission for a nomenclature of organic reactions and organic reaction mechanisms as published in the IUPAC *Information Bulletin* No. 48 (October 1974) were sent in 1975 in modified form to over 150 physical organic chemists all over the world with a request for both general comments and specific proposals. The response has been very favourable. The proposals were also discussed in plenary sessions at the (American) Reaction Mechanisms Conference in Williamsburg, Virginia

(June 1976) and at the 3rd IUPAC Conference on Physical Organic Chemistry in La Grande Motte, France (September 1976). At both places chemists expressed significant interest in a nomenclature of reactions and (if possible) of mechanisms for indexing purposes.

Two meetings of the Commission were held during the Third IUPAC Conference on Physical Organic Chemistry at La Grande Motte, France. The meetings were also attended by Dr. R. A. Y. JONES (University of East Anglia, Norwich) and Prof. M. J. PERKINS (Chelsea College, London) who received Wates Bursaries for that purpose.

59 replies to the Commission's report of November 1975 were received, only 2 of which were definitely unenthusiastic about the Commission's tasks. The meeting considered the suggestions received concerning the naming of reactions, and it was agreed that the original system suggested by Prof. J. F. BUNNETT for substitution reactions could be extended to include other simple reactions and that a working party chaired by him should investigate this. It was further agreed that the naming of 'complex' reactions should be dealt with by separate working parties and that experts be asked to chair working parties dealing with the naming of pericyclic reactions and the indexing of complex reactions, respectively. Prof. J. MARCH (Adelphi University, New York) has agreed to chair the second party.

A number of suggestions concerning the problem of mechanistic nomenclature had been received and it was decided to ask the interested parties, Prof. R. G. GUTHRIE (University of Kentucky), Dr. R. A. JACKSON (University of Sussex) and Dr. J. S. LITTLER (University of Bristol) to set up working parties to elaborate their ideas.

A working party, headed by Prof. V. GOLD, will deal with the problem of the definition of terms used in physical organic chemistry.

It is hoped that the working parties will produce a final report on their work in ca. 12 months, and during that time suggestions concerning the work are welcome.

Commission III.3: Photochemistry

Prof. M. S. WRIGHTON (M.I.T., Cambridge, USA) has been nominated a Titular Member in succession to the late Prof. E. KOERNER von GUSTORF. Prof. F. C. De SCHRYVER has also been nominated a Titular Member. Since Prof. O. L. CHAPMAN resigned in 1976 from the Commission, Profs. SCHAFFNER and De SCHRYVER have been appointed Chairman and Secretary, respectively. With its present nine members the composition of the Commission is now well balanced, with appropriate representations of physical, inorganic and macromolecular photochemistry, photobiology, and spectroscopy added to the organic photochemistry group.

Projects: (i) Preparatory work on Terms and Symbols in Photochemical Literature and Guidelines for Recording Experimental Data in Photochemistry has been continued, and task groups will be assigned to specific topics at the 1977 Meeting in Warsaw. (ii) Upon active promotion by the Commission, the Japanese Photochemistry Association has been founded. Its

statutory activities will be quite similar to those of the Inter-American and the European Association. Close contacts between the three Associations and the Commission are being maintained.

Commission III.4: Medicinal Chemistry

(i) The Commission published three *Newsletters* (Nos. 12, 13 and 14) which were, as usual, very well received. (ii) The Committee report 'Predicted Compounds with Alleged Biological Activities' was distributed in response to numerous requests. Many of these requests were in response to a letter written by Dr. RACHLIN which was published in the *Journal of Pharmaceutical Sciences* 65 (3), IV (1976) and reprinted in *Bioinorganic Chemistry* 6, 271 (1976). (iii) The Commission was engaged in symposia, namely the Symposium on Drug Action at the Molecular Level (London, 1976) and the 5th International Symposium on Medicinal Chemistry (Paris, 1976) as well as in forthcoming events, namely the IUPAC-IUPHAR Symposium on Biological Activity and Chemical Structure (Noordwijkerhout, The Netherlands, 1977) and the 6th International Symposium on Medicinal Chemistry (Brighton, UK, 1978). (iv) The correspondent network of the Commission was expanded to include Spain, Brazil and the Pan American Organization. (v) The Commission met in Paris on 19 July 1976.

25 April 1977

H. ZOLLINGER
President, Organic Chemistry Division

IV. MACROMOLECULAR DIVISION

Report to Council

The activities of the Division centered around the following topics: (i) Sponsorship of symposia – macro-symposia, and microsymposia; (ii) the efforts of the two Working Parties; (iii) Commission IV.1 on Macromolecular Nomenclature; (iv) Commission IV.2 on Polymer Characterization and Properties.

The Macromolecular Division Committee had a very high turnover in personnel, both in Titular and Coopted Members, occurring because of the new Statutes of IUPAC and the elections in Madrid. The current list of members is given on pages 79–82 of *Comptes Rendus 28th Conference: Part A*. Due to the fact that we had this large turnover, we decided that it was important to hold an official meeting of the Division Committee in an off-Conference year. This meeting was held in Paris (France) on 3 July 1976 and there was a good attendance. [Details of the meeting have been published in *Inf. Bull.* No. 54 (1977), pp. 53–59.] The discussions were centered around approval of symposia and the activities of the two Commissions.

Sponsorship of Symposia

In 1976, the sponsorship of the Division was afforded to the following symposia – all are microsymposia:

- Symposium on Photochemical Processes in Polymer Chemistry, Leuven, Belgium, held 2–4 June (Prof. G. SMETS)

- Second International Symposium on Polyvinylchloride, Lyon-Villeurbanne, France, held 5–9 July (Dr. A. GUYOT)
- 16th Prague Microsymposium: Advances in Scattering Methods, Prague, Czechoslovakia, held 12–16 July (Dr. SEDLÁČEK)
- Fifth Discussion Conference on Macromolecules: Phases and Interfaces in Polymer Systems, Prague, Czechoslovakia, held 12–16 July (Dr. POUCHLY)
- International Symposium on Long-Term Properties of Polymers and Polymeric Materials, Stockholm, Sweden, 30 August–3 September (Prof. RÅNBY)

In addition, the following symposia have been approved for the following years:

1977

- International Symposium on Macromolecules, Dublin, Ireland, 17–22 July (Prof. D. C. PEPPER)
- 17th Prague Microsymposium on Chemical Problems of Medical Polymers, Prague, Czechoslovakia, 15–18 August (Prof. J. KÁLAL)
- Macromolecular Symposium, Tokyo, Japan, to be held as part of the XXVI Congress of IUPAC, 5–10 September

1978

- Microsymposium on Polymer Dispersions, Dresden, German Democratic Republic, 1978 (Prof. PHILIPP) (originally planned for 1977)
- 18th Prague Microsymposium on Synthetic and Semisynthetic Polymeric Catalysts and Affinants, Prague, Czechoslovakia, 10–13 July (Prof. J. KÁLAL)
- 6th Discussion Conference on Chromatography of Polymer and Polymers in Chromatography, Prague, Czechoslovakia, 17–21 July (Prof. J. KÁLAL)
- 25th International Symposium on Macromolecules, Tashkent, USSR, 17–21 October (Prof. K. A. ANDRIANOV)

1979

- Symposium on Macromolecules, Mainz, Federal Republic of Germany, 17–21 September (Prof. R. C. SCHULZ)

1980

- Symposium on Stereospecific Polymerization (celebrating the 25th anniversary of isotactic polymerization), Viareggio, Italy (dates not finalized yet).

Miscellaneous Matters

Also of importance was the decision by the Division Committee to prepare a summary of working Statutes and Bylaws of the Macromolecular Division.

The Division Committee also considered a proposal from Prof. RÅNBY concerning the need to draw attention to the ever-existing problem related to insufficient training in polymer science in many universities. Prof. BAMFORD agreed to discuss this question with Prof. SHELDON of the University of Bradford (UK) who has gathered detailed information on this subject. Prof. SHELDON has responded to Prof. BAMFORD and provided a narrative summary of polymer programs throughout the world. This has

been distributed to the Division. Future transaction with the IUPAB in the area of biopolymers was also considered.

The Secretary of the Macromolecular Division, Dr. A. J. de VRIES, was invited to edit once a year a short *News Bulletin* (at most one page typed) for distribution to the editors of national polymer journals or other regular publications. Profs. BAMFORD, SCHULZ, and TEYSSIE expressed their willingness to take charge of the publication in their respective countries. The *News Bulletin* would be based essentially on the minutes of the Division Committee meetings, and its distribution would proceed through the Oxford Secretariat. The first issue of the *News Bulletin* has since been distributed to Members of Division Committee, Commissions and the Working Parties, and the National Representatives.

Commission IV.1: Macromolecular Nomenclature

The Commission held a meeting in Dorking (UK) on 7–11 June 1976, chaired by Dr. K. L. LOENING. Receipt and discussion of a number of comments on the earlier recommendations issued by the Commission on the nomenclature of regular single-strand organic polymers [Provisional Nomenclature Appendix No. 29 (November 1972) to *Inf. Bull.*] has led to the preparation of an updated version. Work on this document has been completed and the manuscript has been sent to the IUPAC Secretariat for publication in *Pure and Applied Chemistry*.

Other topics on which the Commission is working are: (i) Stereochemical definitions and notations for macromolecules; (ii) Nomenclature and symbolism of copolymers; (iii) Subsidiary definitions of terms relating to polymers; (iv) Definitions for physical properties of polymers; (v) Definition and nomenclature of ladder polymers; (vi) Nomenclature of inorganic polymers; (vii) Classification and family names of polymers; (viii) Interpenetrating polymer networks. Of these, (i) and (ii) are at the most advanced stages and were discussed in detail in Dorking. Tentative recommendations dealing with (i) and (ii) are expected to be issued in 1977.

Through exchange of observers, joint meetings and/or correspondence, our Commission cooperates closely with many commissions and committees engaged in nomenclature work of overlapping interest. Among these TC 61 (Plastics) and TC 38 (Textiles) of the International Standards Organization (ISO), and the Commission on Biochemical Nomenclature (CBN) of IUPAC–IUB should be singled out.

Assuming financial support, it is planned that our Commission will meet during the IUPAC Conference in Warsaw this year and also will have an observer at the 1977 CBN meeting.

Commission IV.2: Polymer Characterization and Properties

The Commission met at Rhone-Poulenc Research Centre, Antony (France) on 2 July 1976 under the chairmanship of Dr. J. W. BARRETT. There are now four Working Parties of the Macromolecular Division, and the Chairmen of these Working Parties are Titular Members of the Commission. Prof. G. ALLEN has

been confirmed as Secretary of the Commission. The Bureau will recall that the working party concept has been modestly successful in the Macromolecular Division. The Working Party on the Structure and Properties of Commercial Polymers is the oldest Working Party and highly productive. It may be of interest to the Bureau that this Working Party has members representing 13 industrial firms and 9 universities from 11 countries. It is impossible to summarize the intense activity of the Working Party in this brief summary report, but details are available on request. Dr. P. L. CLEGG from the Imperial Chemical Industries Ltd., is now the Chairman of this Working Party, having taken over from Dr. A. J. de VRIES who has become the Secretary of the Division.

The second Working Party on Molecular Characterization of Commercial Polymers has been chaired by Prof. BENÔIT as an Acting Chairman for a number of years. Dr. Th. G. SCHOLTE of the Dutch State Mines has now agreed to be the Chairman.

The third Working Party is on Supported Polymer Film, chaired by Mr. P. H. FINK-JENSEN. Some of the members of this Working Party came from the Organic Coatings Section of the Applied Chemistry Division which was transferred as a Working Party to the Macromolecular Division.

A fourth Working Party entitled The Thermodynamic Properties of Polymers is now chaired by Dr. H. WILSKI, and this new Working Party has laid out a substitute program for a project concerning Glass Transition Properties of Polymers.

Commission IV.2 had very active discussion on the coordination of programs of the Working Parties. The Commission also recommended strongly to the Working Party on Supported Polymer Film that the scope of the Working Party should be broadened, and made specific recommendations. Although the topic of a new Working Party was discussed, both in the meeting of the Commission and the Divisional Committee meeting, it was felt that at the moment we would not extend our activities until we could consolidate all the new programs undertaken.

It should be noted that the Divisional Committee critically reviews the program of the Working Parties of the Division every two years in order to ascertain whether the performance of the Working Party is adequate or germane to its original mission.

29 April 1977

C. G. OVERBERGER
President, Macromolecular Division

V. ANALYTICAL CHEMISTRY DIVISION

Report of President

The Analytical Chemistry Division has been very active in the past year in a number of areas. First, the Division Executive Committee met on 3–4 September 1976, in Aberdeen, Scotland, to review the program status of the Commissions and to revise the Division operating rules and bylaws. The revised and updated rules and bylaws were submitted to the Secretariat for comment. A second meeting of the Division Committee will be held on 14–15 May 1977, in Oak Ridge, Tennessee, USA, to incorporate the Secretariat's comments and prepare a final version for IUPAC approval.

The major portion of the Division program is represented by the reports of the various Commissions. Since my last report to the Bureau, 10 reports have been published in *Pure and Applied Chemistry*. An additional 14 have been approved by the Division Committee and are awaiting publication by IUPAC. Ten reports are outstanding, i.e. undergoing review and comments by Division Committee members. This status report represents substantial progress by the Commissions and Division Committee towards accelerating the process of completing and publishing the work of the Division, which has been one of our priority objectives this past year.

Our progress in reviewing the ISO International Standards has been outstanding. Sixteen methods have been reviewed and given final approval in the past year; six methods are still in the review stage. The procedure for handling these methods has worked quite effectively, and we are meeting the requested decision dates consistently.

Prof. H. FREISER has represented the Division in its cooperative program with the Applied Chemistry Division concerning harmonization of collaborative analytical studies. An international symposium of representatives from concerned organizations is tentatively scheduled for 9–10 March 1978. The venue has yet to be decided. This symposium will represent a major advancement in this extremely important area.

Commission V.1: Analytical Reactions and Reagents

The Commission continued work on the CEE methods for determination and identification of various substances. The methods from the 1976 contract have been discussed in detail. Further progress in this field should result in closer contacts with the CEE people responsible for the standardization work.

The Commission discussed cooperation with ISO in preparing a proposed book, *ISO Standards for Reagents for Chemical Analysis*. This work will be a very important future activity for the Commission. The matter of primary standards in cooperation with ISO is in the course of discussion, and because of rejection of the sulphamic acid as a standard by ISO, requires closer liaison between people of both organizations.

The report on redox indicators has been improved according to the suggestions of the Division Committee presented in Madrid and is now circulating for the second time, which results in some delay in completing the project. The work on the report on complexometric indicators was continued. After discussion, the report will be prepared in an altered mode. This work needs cooperative work because of its scope, and efforts in this matter have been resumed.

The report on expression of results in colorimetry and fluorimetry has been the subject of some controversy; a final decision will be reached at the General Assembly in Warsaw. The report on amine determination and on determination of phenols used as anti-oxidants will be finalized at the General Assembly. The report on nonaqueous acid–base indicators has been discussed in its initial form and after introducing improvements, will be presented at the General Assembly for final resolution. The report on organostannic compounds and metallic traces in food additives is expected to be presented also.

It should be mentioned that the Commission held the meeting on 11 May 1976 at the Roussel-Uclaf Laboratories, Romainville, Paris, when the above-mentioned subjects and others were discussed.

Commission V.2: Microchemical Techniques and Trace Analysis

The Commission currently has programs in progress involving both microanalysis and trace analysis, with greater emphasis on the latter at this particular time. A substantial number of reports in the series 'General Aspects of Trace Analytical Methods' have been prepared involving such aspects as methods of calibration, availability of standard reference materials, contamination, stability of standard solution, decomposition of biological sample, etc. One report has been published, two reports are in press, and several more are nearing completion.

Another important study to be completed by August 1977 involves recommended nomenclature and procedures for the trace analysis of surface. Tentative recommendations have been submitted worldwide for evaluation by surface scientists and their replies will be used to prepare the final report. A new series of studies entitled 'Separation and Preconcentration' has been started and two reports, one on evaluation of techniques and the other on preparation of high-purity lead, will be completed by August 1977. One micro-analytical study involving the analysis of organoboron compounds is nearing completion.

Reports

General Aspects of Trace Analytical Methods. I. Methods of Calibration in Trace Analysis, *Pure Appl. Chem.* **41** (3), 397 (1975).

– II. Standard Reference Materials for Trace Analysis. Part 1. Present status of Availability and Applications, *Pure Appl. Chem.*, in press.

– – Part 2. Available Standard Reference Materials, being prepared for publication in *Pure Appl. Chem.*

Commission V.3: Analytical Nomenclature

The Commission met in London on 10 December 1976 in order to discuss *Compendium of Analytical Nomenclature* and other important nomenclature projects. The following five tentative reports have been submitted to the Division for publication as Appendices on Provisional Nomenclature: (i) Recommendations for Publication of Papers on Precipitation Methods of Gravimetric Analysis; (ii) Recommendations for Publications of Papers on Ion-Selective Electrodes; (iii) Recommended Nomenclature for Liquid–Liquid Distribution (Solvent Extraction); (iv) Recommendations on the Nomenclature of Sampling in Applied Chemistry; (v) Recommendations for Nomenclature of Thermal Analysis (Combined ICTA Reports II and III).

The following three final nomenclature reports have been submitted to the Division for publication in *Pure Appl. Chem.* (i) Recommended Nomenclature for Scales of Working in Analysis; (ii) Recommendations on Synonyms and Trivial Names in Analytical

Chemistry; (iii) Recommendations for Publication of Papers on Methods of Molecular Absorption Spectrophotometry in Solution between 200 and 800 nm.

The following final report has been published: Recommendations for Nomenclature of Ion-Selective Electrodes, *Pure Appl. Chem.* **48** (1) (1976).

Members of the Commission are actively engaged on the following further nomenclature projects:

1. Compendium of Analytical Nomenclature. (A Division project which has received special attention and which is ready for publication.)
2. Terms 'equivalent' and 'normal'. (Further talks with IDCNS are under way.)
3. Luminescence Spectroscopy.
4. Kinetic Methods.
5. Exchanging Sorbents.
6. Automated Analysis.
7. Information Storage and Retrieval.

Because of the remarkable activities of all Members concerned, the work of the Commission is progressing very satisfactorily.

Commission V.4: Spectrochemical and Other Optical Procedures for Analysis

Two of our nomenclature documents have been printed in final form in *Pure and Applied Chemistry*, i.e. Part II on Data Interpretation and Part III on Flame Spectroscopy. Part II was reprinted in *Analytical Chemistry* in December 1976 and both Parts II and III are to be reprinted in *Applied Spectroscopy*. Our Part IV document was printed in provisional form in December 1976 and should be revised and submitted in final form shortly after the 1977 IUPAC meeting in Warsaw. Work is progressing on Part V on Excitation Sources with the expectation that a further revision will be ready for discussion in Warsaw. Part VI on Molecular Spectroscopy was being prepared jointly with Commission V.3 but our representative, Prof. WINEFORDNER, has resigned from Commission V.4 so the next draft will be prepared by Dr. MENIS of V.3. The glossary of terms used in our nomenclature documents has been updated by Dr. STRASHEIM through Part IV.

Commission V.5: Electroanalytical Chemistry

Reports Published

(i) Classification and Nomenclature of Electroanalytical Techniques, *Pure Appl. Chem.* **45**, 81 (1976). (ii) Status of the Faraday Constant as an Analytical Standard, *Pure Appl. Chem.* **45**, 125 (1976). (iii) Recommendations for Sign Conventions and Plotting of Electrochemical Data, *Pure Appl. Chem.* **45**, 131 (1976). (iv) Hexamethylphosphoramide: Purification and Tests for Purity, *Pure Appl. Chem.* **44**, 115 (1975). (v) Sulpholane: Purification and Tests for Impurities, *Pure Appl. Chem.* **49**, 211 (1977). (vi) Voltammetric Half-Wave Potentials in Sulpholane as Solvent, *Pure Appl. Chem.* **49**, 217 (1977).

Report in Press

(i) *N,N'*-Dimethylformamide: Purification and Tests for Impurities. (ii) Half-Wave Potentials of Inorganic Substances in *N,N'*-Dimethylformamide.

Report under Consideration

Proposed Terminology and Symbols for the Transfer of Solutes from One Solvent to Another.

Projects

(i) Half-Wave Potentials in Hexamethylphosphoramide. Report in preparation. (ii) Half-Wave Potentials in Propylene Carbonate. Report in preparation. (iii) Recommended Terms, Symbols, and Definitions for Electroanalytical Chemistry. Preliminary report discussed with I.3 and V.3 in Madrid; Discussed in depth at interim meeting with I.3 on 1–2 July in Paris. (iv) Applications and Potentialities of Electroanalytical Techniques in Environmental Analysis. Position paper in Madrid, discussed with V.6. Preliminary report planned for Warsaw. (v) Selectivity of Ion-Selective Electrodes. Report in preparation. (vi) Standard Potential of the Silver–Silver Chloride Electrodes. Discussed with I.3 in Paris; final report to be presented at Warsaw. (vii) Conditional Diffusion Coefficients. Position paper in Madrid; report at Warsaw. (viii) Indicator Electrodes in Non-Aqueous Solvents. Position paper in preparation. (ix) Application of Ion-Selective Electrodes, Other Than Those for Hydrogen Ion, in Non-Aqueous Solvents. Position paper expected in Warsaw, where it will be decided if a full report is justified. (x) Acid–Base Dissociation Constants in Propylene Carbonate. Discussed with V.6. Report expected in Warsaw. (xi) Concise Summary of Electroanalytical Nomenclature. Report in preparation. (xii) Voltammetric Studies of Metal Complexes in Non-Aqueous Solvents. Position paper expected in Warsaw. (xiii) Recommendations on Reporting of Electroanalytical Data. Will serve as a useful guide for authors and thereby improve the quality of manuscripts; in preparation. (xiv) Potentiometry and Voltammetry in Marine Chemistry. Position paper at Warsaw. (xv) Comparison of Electroanalytical Detectors with Other Detectors in Chromatography. Report expected in Warsaw. (xvi) Electroanalytical Chemistry of Intermetallic Compounds in Mercury. Report at Warsaw. (xvii) Diffusion Coefficients in Mercury. Report at Warsaw. (xviii) Voltammetric Half-Wave Potentials of Inorganic Substances in Acetonitriles. Report at Warsaw. (xix) Assessment of Performance of pH Electrodes at High Temperatures, High pH, and High Concentrations of Other Ions. Preliminary report at Warsaw.

A liaison meeting between representatives of Commissions I.3 and V.5 was held in Paris, 1–2 July 1976. Commission V.5 was represented by Prof. BATES (Chairman), COETZEE (Secretary), and NÜRNBERG. Matters of policy and overlapping programs of the two Commissions were considered, and two major nomenclature reports were discussed in detail.

Commission V.6: Equilibrium Data

Reports

With the establishment of the new IUPAC Chemical Data Series, we are hopeful that the publication of numerous reports which have been prepared by this Commission will be facilitated. The volumes which reflect the work of this Commission are:

- Vol. 1: Critical Evaluation of Some Equilibrium Constants Involving Organophosphorus Extractants (Subseries: Critical Evaluation of Equilibrium Constants in Solution; Part B – Equilibrium Constants in Liquid–Liquid Distribution Systems).
- Vol. 2: Critical Evaluation of Some Equilibrium Constants Involving Alkylammonium Extractants (Subseries: Critical Evaluation of Equilibrium Constants in Solution; Part B – Equilibrium Constants in Liquid–Liquid Distribution Systems).
- Vol. 3: Organophosphorus Extractants (Subseries: Equilibrium Constants of Liquid–Liquid Distribution Reactions).
- Vol. 4: Alkylammonium Salt Extractants (Subseries: Equilibrium Constants of Liquid–Liquid Distribution Reactions).
- Vol. 10: Ion Exchange Equilibrium Constants.
- Vol. 12: Dissociation Constants of Organic Bases in Aqueous Solution: Supplement 1972.

The introductory chapter by Prof. BECK for the new 'Critical Evaluation of Equilibrium Constants in Solution' series was prepared in camera-ready form in Buffalo, and it will appear shortly in *Pure Appl. Chem.*

Projects

(i) *Stability Constants*. Work on the stability constants supplements is progressing. Final typing has begun on the organic ligands supplement, which will include an addendum to the tables to keep them as up to date as possible. Data collection of the pK's of some 3500 organic acids is near completion. Typing will begin in the very near future.

(ii) *Distribution Equilibria*. The following reports are presently being prepared in camera-ready form: (a) Compound Forming Extractants, Solvating Solvents, and Inert Solvents (Subseries: Equilibrium Constants of Liquid–Liquid Distribution Reactions). (b) Chelating Extractants (Subseries: Equilibrium Constants of Liquid–Liquid Distribution Reactions). Prof. KERTES is continuing the manuscripts for publication in this important series.

(iii) *Critical Surveys of Solution Equilibrium Constants*. The introductory chapter by Prof. BECK has or will shortly appear in *Pure Appl. Chem.* The first volumes in this series by Prof. ANDEREGG on EDTA complexes and the volume by Prof. McBRYDE dealing with 1,10-phenanthroline and 2,2'-Bipyridyl complexes are ready for publication. A critical survey of fluoride complexes by Profs. BOND and HEFTER is in the final stages of completion. In Series B, 'Critical Surveys of Equilibrium Constants in Liquid–Liquid Distribution Systems', edited by Prof. KERTES is in press, and Prof. STARY's paper on 8-hydroxyquinoline is in its final stages of revision by the author. Other surveys in the series which are presently being prepared include: High-Molecular Weight Carboxylic Acids; Dinonylnaphthalene; Sulfonic Acid; Acetylacetone; Dithiones; 2-Thenoyltrifluoroacetone.

(iv) *Information Retrieval*. Prof. HUME has completely overhauled the Flag List and is soliciting comments outside the chemical profession.

(v) *Solubility Data Project*. Excellent progress is being made on this project under the direction of Prof. KERTES. A subcommission meeting was held at the Virginia Polytechnic Institute, Blacksburg, Virginia, in July 1976. As a result of extensive discussions at this meeting on guidelines for compilers and evaluators, the appointment of topic editors, publication policy and financing, all parts of the Solubility Project are now proceeding satisfactorily. Gas/Liquid, Liquid/Liquid systems, and most recently the Solid/Liquid systems, have now all been established. Dr. SALOMON has been very active, as topic editor for the Solid/Liquid system, in preparing a set of guidelines and in establishing contact with numerous scientists interested in participating in this project.

Commission V.7: Analytical Radiochemistry and Nuclear Materials

Commission V.7 has continued work on seven important projects which are nearing completion: (i) Reference Materials and Inter-Comparison Samples in Radioanalytical Chemistry. (ii) Teaching Aspects of Radioanalytical Chemistry and the Analysis of Nuclear Materials. (iii) Glossary of Nuclear Terms. (iv) Contribution to Data Flagging Projects. (v) State-of-Art in Thorium Analysis. (vi) Light Elements Analysis by Radioanalytical Methods. (vii) Radioactive and Isotopic Specifications of Labelled Compounds.

Commission V.7 has added six significant new projects: (i) Study of the Possibility to Organize a World Conference on Radioanalytical Chemistry and Nuclear Materials. (ii) Initial Survey of the Radioanalytical Problems Associated with Fusion Reactors. (iii) Critical Evaluation of Radio-Immunoassay and Related Methods. (iv) Analytical Aspects of the Dating Carbonates by Uranium and Thorium. (v) Liquid–Liquid Extractions in Radioanalytical Chemistry. (vi) Nuclear Techniques for the Analysis of Molecular Compounds.

Report

Recommended Procedure for the Measurement of 14-MeV Neutron Fluxes from Accelerators for Activation Analysis, *Pure Appl. Chem.* **49**(3) (1977). The Commission meeting was held on 15 September 1976 in Munich (FRG) to examine the results obtained and to discuss future programmes.

1 May 1977

NOBUYUKI TANAKA
President, Analytical Chemistry Division

VI. APPLIED CHEMISTRY DIVISION

Report of President

Following the changes in the Statutes and Bylaws made by Council in Madrid on 9 September 1975, the Applied Chemistry Division has adapted its structure in accordance with S 10.4 and B 4 and now comprises, in addition to the Division Committee, nine Commissions. The latter include two Commissions on separate aspects of food and two on pesticides, coordination being effected in each case by a Co-ordinating Committee on Food (or Pesticide) Chemistry made

up from members of the Commissions concerned. The new Commission on the Reclamation of Solid Wastes which was approved in 1975 is in keeping with the Division's current policy of programme diversification but this also extends to the detailed programmes of the other Commissions. Moreover, the Division is also currently working towards a position whereby each pair of Commissions referred to above becomes a simple Commission thus reducing the total number to seven. This would then give scope for further diversification of the Division programme as a whole.

A high proportion of the programme, not incorrectly, is analytical in character and liaison has been maintained with the Analytical Chemistry Division and, in view of some common environmental interests, the Section on Clinical Chemistry. As President of the Division I have taken a full part in the discussions of the *ad hoc* Committee on Environmental and Health Chemistry, a subject which, together with the continued diversification of the Division's programme was also considered at the meetings of the Division Committee in Frankfurt 8–9 July 1976. These will again be discussed at the 29th General Assembly in Warsaw in 1977. The Commissions met during 1976 as follows:

Food Additives: Paris, September

Food Contaminants: Paris, September

Fermentation: Berlin, June

Oils, Fats and Derivatives: Lyngby, June

Terminal Pesticide Residues: Dernbach, September

Pesticide Residue Analysis: Dernbach, September

Reclamation of Solid Wastes: Berlin, June

The Air Quality Commission and the Water Quality Commission did not meet, the former on account of the indisposition of the Chairman of the Commission. The 1975 Report of the President was published in the *Comptes Rendus 28th IUPAC Conference: Part B* at pp. 60–65.

The Division Committee itself has been concerned with possible areas of programme diversification and has in particular discussed chemical problems in the area of marine chemistry with ICSU Scientific Committee on Oceanic Research (SCOR). A number of areas of joint interest have been identified and a correspondence network has been proposed which would also involve other IUPAC Divisions.

There is still a need for the further standardization in some areas of trivial names for chemicals and reagents. Some aspects of the subject have been well developed both within IUPAC and outside, notably polymers, analytical reagents, pesticide chemicals and pharmaceuticals. Some of these, and certain others which were studied earlier (for example by ISO and national standards committees), may need to be brought up to date. The main need is for the whole area to be reviewed, documented and where appropriate, revised. The new information should then be brought together in a single publication: this need not be explicitly comprehensive but it should serve as a guide to the whole field, with specific recommendations for individual sectors as appropriate.

Liaison with the Analytical Chemistry Division has in particular been concerned with the arrangements for an International Symposium on the Harmonization of Collaborative Analytical Studies, to be held in London 9–10 March 1978; the arrangements have also

extended to the Section on Clinical Chemistry. This is referred to again in more detail below.

Members of the Division Committee act in a co-ordinating role with the Commissions on an individual correspondence basis and they have also evaluated the current programmes of the Commissions. The evaluations have been brought together into a single document upon which the Division Committee bases its review of the whole programme. The current work of the individual Commissions is described briefly below.

Commission VI.1: Food Additives

The work of the Commission has included the study of trace volatile nitrosamines (jointly with the International Agency for Research on Cancer), nitrates and nitrites, residues from livestock treated with veterinary chemicals and a multi-residue approach to the problem of detection and estimation of anti-oxidants in food. Consideration has also been given to methods of analysis for traces of *N*-heterocyclic carcinogens in food and projects are under evaluation for fibre content and for malonaldehyde in meats. A survey of analytical methods available for the estimation of artificial sweeteners in food has been completed and is in the course of publication in *Pure Appl. Chem.*

Commission VI.2: Food Contaminants

The work of the Commission has included the study of contaminants from food packaging and methods of analysis for a range of toxic trace elements in food. Revised methods for cadmium, lead and mercury are in the course of publication and a revised method for copper is ready for publication. Other methods under study relate to selenium and tin. The Commission also has a substantial programme of work relating to mycotoxins in foods: this includes the study of methods for 'multi-mycotoxin' analysis, a mini-column method for ochratoxin, saxitoxin in marine products and methods for aflatoxin M₁ in dairy products. A recommended method for ochratoxins A and B in barley has been published (IUPAC *Technical Report* No. 14, September 1976) and other reports are being prepared on sampling plans for shelled peanuts for mycotoxin estimation and on methods for aflatoxin in copra meal and coconut. Methods of sampling and decontamination for mycotoxins are also under study and the Third Symposium on Mycotoxins in Foodstuffs was held in Paris on 16–18 September 1976 attended by about 320 participants from 40 countries. The proceedings and those of the Second Symposium held on Pulawy in 1974, are also being published.

Co-ordinating Committee on Food Chemistry

Three projects are organized jointly by the Co-ordinating Committee on Food Chemistry on the control of purity requirements for food additives, rapid schemes for food analysis and quality factors for meat. The proceeding of an International Symposium on Advances in the Smoking of Foods held in Warsaw 7–10 September 1976 are in the course of publication, and preparations are being made for the publication of specifications for dispersion solvents used in food.

Commission VI.3: Fermentation

The Commission is concerned with the organization of three major international conferences, the 3rd International Symposium on the Genetics of Industrial Micro-organisms to be held in Madison (USA) 5–9 June 1978; the 6th International Fermentation Symposium in 1980 in London (Ontario, Canada); and the 7th Symposium in 1984. The 5th International Fermentation Symposium was held in Berlin 28 June–3 July 1976. These are meetings of major importance, fermentation being a production technique of great significance as the world's resources of hydrocarbons become scarcer and more expensive. Projects under practical study include guidelines for the safety and quality of proteins of microbial origin for animal feeds, methods for estimating the fermentation power of bakers' yeast (jointly with the International Association of Cereal Chemists) and opportunities for the bioconversion of cellulose substrates. Others include the preparation of a key list of newsletters for information exchange and a glossary of terms and symbols used in fermentation literature. A report has also been prepared on the formulation of curricula for biochemical engineering: this, together with progress in the other fields above, will be discussed at the forthcoming General Assembly in Warsaw in August 1977.

Commission VI.4: Oils, Fats and Derivatives

The Commission on Oils and Fats has for many years been recognised internationally as the authoritative body on methods for the analysis and identification of oils and fats. A fourth supplement to the fifth edition of the bilingual IUPAC Methods Book has been issued, and much of the current programme is concerned with the publication of the sixth edition. The international character of this enterprise is well defined with a large number of National Representatives giving active support to the titular and associate members of the Commission. There are some 14 individual projects, relating to methods: total oxidised fatty acids, free and esterified tocopherols, organochlorine pesticide residues, *cis-cis* linoleic acid content, emulsifiers, extractives from plastic polymers, acid value and unsaponifiable matter. These all represent practical aspects of the basis for world-wide trade in oils and fats, as regards both commercial value and safety and freedom from injurious substances. Much attention has been given in recent years to the modernization of traditional empirical methods, using where appropriate such techniques as high performance liquid chromatography and nuclear magnetic resonance.

Commission VI.5: Air Quality

The work of the Commission on Air Quality is itself currently undergoing diversification, being formerly based on the important but relatively narrow field of industrial hygiene. The programme includes projects on the characterization of aerosols, organic isocyanates in air and metal fumes but progress has been limited by the indisposition of the Chairman. Proposals for a broader programme have now been made and these will be discussed fully at the General Assembly in August 1977.

Commission VI.6: Terminal Pesticide Residues

Current work is concerned with the identification and evaluation of residues arising from the use of organophosphorus pesticide chemicals, triazine herbicides and dithiocarbamates, together with problems arising from the photodegradation of chlorophenols, ethylene thiourea and the possibility of nitrosamine formation. A major review of residues arising from ethylene thiourea has been prepared and is, together with five other reports, in the course of publication. Most of the projects on the above work will continue after 1977, with priority on dithiocarbamates and ethylene thiourea, nitrosamines, the chlorophenols and such compounds as TCDD.

Commission VI.7: Pesticide Residue Analysis

The subject of residue analysis frequently arises once the nature of the terminal residue resulting from the use of pesticides has been established and any risks thereby involved evaluated. This may lead to a separate series of problems, which are the basis of the programme of the Commission. The problems can be approached according to the type of chemical (usually complex and often synthetic) involved, for example the organochlorine and organophosphorus compounds, carbamates, dithiocarbamates, rethrans and quaternary herbicides. They are also approached according to the main analytical separatory and measurement techniques involved, including liquid-gel permeation and chromatographic detectors, with special reference also to the methods available for the confirmation of the chemical identity of substances whose constitution is not known at the time of sampling for analysis. There is an interest in the development of simpler methods of analysis and a special study of non-chromatographic methods is also in progress.

Coordinating Committee on Pesticide Chemistry

The work of the two Pesticides Commissions is closely associated with that of other major international bodies concerned with the safe and effective use of pesticides in plant and animal husbandry, notably the Codex Committee on Pesticide Residues and the FAO–WHO Joint Meeting on Pesticide Residues. The Coordinating Committee acts as a focus for the work of the two Commissions in these areas and for other major enterprises including the arrangements for the IV International Pesticide Congress, to be held in Zürich during 24–28 July 1978.

Commission VI.8: Water Quality

Like the Commission on Air Quality, progress in the work of the Water Quality Commission has been limited and further discussions, based on new and diversified proposals will be held on the occasion of the General Assembly in August 1977, based in part on the interests identified in the liaison discussions with SCOR referred to above. Current interests centre on chemical aspects of pollution abatement in industry, nomenclature and education in water chemistry, analytical and other chemical aspects of the work of ISO Technical Committee 147 on Water Quality and

the work of ICSU Scientific Committee on Water Research (COWAR), the programme of which is also currently under revision.

Commission VI.9: Reclamation of Solid Wastes

This new Commission has been actively pursuing the chemical classification of solid wastes as a basis for the evaluation and solution of reclamation problems. A preliminary report has been considered by the Division Committee and the Commission will convene an international group of scientists at the General Assembly in Warsaw in 1977 to discuss these and make proposals for further action.

Other Matters

As will be seen from the above, several reports of discussions and recommendations arising from the work of the Commissions are awaiting publication. The need for speedier publication is a matter of some concern to the Division Committee. An important aspect of the work of the Division, which involves all of the Commissions is the representation of IUPAC, on an individual basis by appointment by IUPAC President, at meetings of other international bodies in the field of applied chemistry, notably technical committees of the International Organization for Standardization (ISO) and their working groups and expert meetings sponsored by the joint FAO/WHO Codex Alimentarius Commission and other FAO and WHO expert groups. This both gives an opportunity for IUPAC expertise to be applied to problems of a chemical character which may be encountered by these organizations; and enables the programmes of the Division and its Commissions to be adjusted to meet new problems. It was partly from considerations arising from such discussions that arrangements are being made for the joint International Symposium on the Harmonization of Collaborative Analytical Studies. This will be a small meeting, attended (by invitation only) by representatives of international organizations which themselves sponsor such studies, with the object of assessing the ways of comparing methods which have already been established on a collaborative basis and possible ways in which new and unnecessary studies can be avoided.

My own special thanks are due, at the end of a four year period of much reorganization of programmes activity, to my colleagues on the Division Committee and to all the Chairmen, Secretaries and Members of the Commissions. In thanking them all I would convey also my best wishes to my successor to the Presidency of the Division, Prof. HEIKKI SUOMALAINEN and his Secretary Dr. REINHARD MARCUSE.

20 May 1977

H. EGAN
President, Applied Chemistry Division

CLINICAL CHEMISTRY SECTION

Report of Chairman

This Section Committee has worked only through correspondence since the Madrid Conference,

September 1975. The principal activity of the Section has been the work carried out in its four Commissions. To this should be added several types of collaboration with other international bodies or institutions.

Commission on Automation

The Commission reviewed and extensively revised the document: 'Characteristics and Attributes of Instruments Intended for Automated Analysis in Clinical Chemistry' during a 2-day meeting in London, July 1976. This document will be reviewed and commented upon by the Commission and also by the Section in Warsaw, August 1977. It is primarily intended as a guideline for manufacturers of instruments, but should be of benefit to users, in evaluating and comparing automated laboratory instruments.

Work about interfacing different types of clinical chemistry laboratory instruments with computers is in progress. A draft of a document regarding this item is ready for the Warsaw meeting. The Commission has discussed guidelines for development of mechanized analytical instruments and has assigned the different problems to its Members. A first draft of a document will be reviewed in Warsaw.

Commission on Quantities and Units

The Commission on Quantities and Units met for three days in Illkirch (France) in March 1976, again for three days in La Chaux-de-Fond (Switzerland) in September 1976 and finally for three days in Copenhagen (Denmark) in March 1977. The Commission has been represented at several international meetings by individual members of the Commission.

A revised edition of the report 'Quantities and Units in Clinical Chemistry' is ready for approval, as well as a revised 'List of Quantities and Units in Clinical Chemistry'. Work is in progress regarding: (i) Optical Spectroscopy; (ii) Stoichiometric Concentration and Chemical Potential; (iii) Changes in Properties as a Function of Time; and (iv) General Nomenclature in Clinical Chemistry.

Commission on Teaching

The Commission on Teaching met for two days in Prague (Czechoslovakia) in October 1976 in connection with the 2nd European Congress of Clinical Chemistry. A main part of discussions on that occasion was concerned with teaching programmes in developing countries; this item will be further debated in Warsaw on the basis of prepared documents with proposals for curricula. The monograph *Education and Training for Clinical Chemistry*, which is one result of the Commission's work during previous years, was published in spring 1977. The Commission has started work upon the problems of Teaching Clinical Chemistry in the medical curriculum as well as a study of the quality of certification examination procedures in different countries.

Commission on Toxicology

The Commission on Toxicology met for two days in London (UK) in June 1976, for three days in Farming-

ton, (Connecticut, USA) in December 1976, and for two days in Monte Carlo (Monaco) in February–March 1977. One important effort of the Commission was the international four-day symposium: Toxic Metals – Clinical Chemistry and Chemical Toxicology, March 1977, in Monte Carlo (Monaco). At this symposium new scientific results were presented to about 300 participants (from 25 countries), coming from industry, from analytical chemistry, and from medicine. The proceedings of the symposium should be ready for publication in the autumn of 1977.

A special subject: Environmental and Occupational Toxicology of Nickel is treated in a subcommittee of the Commission. Other activities include: (i) work on the Toxicology of Cholinesterase-inhibitors, and (ii) the preparations for an International Symposium on Gas Chromatography–Mass Spectrometry of Drugs, Toxic Agents and Metabolites, provisionally planned for 1979.

Collaboration with International Organizations

The IUPAC Section on Clinical Chemistry collaborates with several other international bodies. In the 2-year period since the Madrid Conference the Section and individual members were consulted by the World Health Organization at different occasions in matters related to clinical chemistry and laboratory work. The close collaboration with the International Federation of Clinical Chemistry and its Committees and Expert Panels continued. Agreement was reached with the International Committee for Standardization in Hematology on an organized system of contact. Good cooperation was also achieved with the Commission on World Standards of the World Association of Societies of Pathology, the Section was represented at the International Symposium on Measurable Properties and Units in Clinical Pathology and Clinical Chemistry, Gaithersburg (Maryland, USA), August 1976.

Within IUPAC the Section is represented by a member in the Interdivisional Committee on Nomenclature and Symbols and with an Observer in the joint IUB–IUPAC Commission on Biochemical Nomenclature. With the Applied Chemistry Division and the Analytical Chemistry Division the Section is preparing for International Symposium on the Harmonization of Collaborative Analytical Studies to be held in London (UK), March 1978.

The proposal to establish a 'Division of Environmental and Health Chemistry' by amalgamating the Section on Clinical Chemistry with Commissions from two other Divisions of IUPAC has of course produced reflections and discussions in the Section. The arguments for and against and the details of the different possibilities will be discussed again in Warsaw.

27 June 1977

P. LOUS
Chairman, Clinical Chemistry Section

COMMITTEE ON PUBLICATIONS

Report to Council

The Committee on Publications has had, during the last two years, to ensure a smooth transition to new

publication methods. The many technical problems associated with the preparation of camera-ready copy have progressively been recognized, as they appeared, and have been solved with the diligent help of the Secretariat in Oxford. The publication schedule has been maintained, despite the deep changes involved.

The Scientific Editors have produced new Notes for Contributors which should help considerably in the preparation of manuscripts, and recently procedures for the approval of symposia, for the appointment of Symposium Editors, and for the handling of manuscripts, have been revised and simplified.

As a first step in reorganizing the structure of IUPAC publications a new series (IUPAC Chemical Data Series) will contain numerical tables previously dispersed over several IUPAC publications. Another series (IUPAC Chemical Reference Books) will comprise miscellaneous technical reports and monographs.

The membership of the Committee has undergone changes, with a new Chairman (Dr. H. GRÜNEWALD from January 1977) and several new members—including one, unfortunately, to replace the late Dr. R. L. KENYON. Once completed, the new Committee should be in a position to refine its analysis of the structure of IUPAC publications, and to try to obtain approval from the higher bodies of the Union for a much needed reorganization along more rational lines.

Other major changes in the period under consideration include a clearer definition of the rôle of the Scientific Editors of the Union (now solely Scientific Editors of *Pure and Applied Chemistry*), and of the rôle of the Assistant Secretary (Publications) (now to provide effective Secretaryship to the publication activities of IUPAC and to the Committee on Publications, but not to be engaged in any technical editing of PAC).

10 June 1977

G. OURISSON
Chairman, Committee on Publications

MINUTES OF 29TH COUNCIL MEETING

19 and 21 August 1977

Present: Dr. R. W. CAIRNS (President, in the Chair), Members of Bureau, Delegates of National Adhering Organizations, Observers of Associated Organizations.

All statutory actions necessary for convening the 29th IUPAC General Assembly and Council Meeting in Warsaw during the period 12–21 August 1977, had been taken through the following letters:

- re.* Official invitation to National Adhering Organizations, 76.11.30 (1311/AT/DV/76)
- re.* Official invitation to Associated Organizations, 76.11.30 (1310/AT/DV/76)
- re.* Members of IUPAC bodies 76.11.30 (1300–1309/AT/DV/76)
- re.* Nomination of Candidates for Elections (Officers and Bureau) and Items of Council Agenda, 77.01.20 (115/GO/MW/JA/77)
- re.* Council Agenda, 77.04.19 (165/MW/JA/77)

re. Announcement of Candidates for Elections (Officers and Bureau), 77.06.23 (537/MW/ES/77)

re. Documentation available for Council Agenda Items, 77.07.06 (588/MW/ES/77)

Minute 1 Introductory Remarks and Finalization of Agenda

In his opening remarks Dr. CAIRNS expressed thanks to the Polish National Committee for Chemistry for inviting the Union to meet in Warsaw and for all the help provided to facilitate the General Assembly.

The Council stood in silence for a short period in remembrance of the colleagues deceased since the last Assembly: C. DRAGULESCU, C. DUVAL, T. ERDEY-GRÚZ, A. N. FRUMKIN, H. KAISER, R. L. KENYON, F. LUCENA-CONDE, D. C. MARTIN, T. MII, E. K. PLYLER, Ch. RESNICK, A. TIUS-MIRÓ, H. SCHMID, U. STILLE, N. V. SUBBA RAO, S. VEIBEL.

Minute 2 Approval of Minutes of 28th Council Meeting

The Minutes of the previous Council Meeting, as circulated to the National Adhering Organizations (76.02.02) and as printed on pages 76–97 of Part B of *Comptes Rendus 28th Conference*, were approved unanimously by the National Delegations.

Minute 3 Announcement of Nominations for Officers and Bureau Members

The papers distributed before the meeting included the nominations received by the statutory deadline, together with biographical notes on each candidate, for the Office of Vice-President and for vacancies amongst the Elected Members of the Bureau. There were no vacancies for the Office of Secretary General or Treasurer. The resignation of Dr. M. A. CRIVELLI meant that there would be an additional vacancy for an elected member of the Bureau.

On the recommendation of the Bureau (Minute 5/77, 37th Meeting – Warsaw), it was *Resolved* unanimously that:

- (i) there be 12 Elected Members of the Bureau for the period 1977–9 (Statute 7.2);
- (ii) the Secretary General, Treasurer, and Dr. W. SPINDEL (nonvoting Secretary of the USA-Delegation) act as Tellers for the elections.

Council noted that, in accordance with Bylaw 2.222, the Bureau had made an additional nomination of Sir DEREK BARTON (no longer resident in UK, having recently moved to work in France) as an Elected Member of the Bureau and also had made recommendations for filling

the 7 vacancies as Elected Members of the Bureau (Minute 5/77, 37th Bureau – Warsaw).

The French Delegation (Prof. J. BÉNARD) enquired whether Sir DEREK BARTON was to be considered as a candidate from France, because he had not been nominated officially by Comité National Français de la Chimie. The Dutch Delegation (Prof. M. MANDEL) pointed out that no National Adhering Organization may have more than one Elected Member of the Bureau (Statute 7.2), and Comité National Français de la Chimie had already nominated officially another candidate from its country. The President said that, in accordance with Statute 14.4, he would give a ruling prior to the actual elections (see Minute 20/77) on the matter. The German Delegation (Dr. W. FRITSCHKE) noted that the recommendations of the Bureau for filling the vacancies as Elected Members of the Bureau were not binding on Council (Bylaw 2.222), and asked for a complete alphabetical listing of all 13 candidates to be provided in order to make possible absolutely neutral elections by Council.

Minute 4 Announcement of Time of Elections

The President announced that the elections would be held at 10.00 on 21 August.

Minute 5 Statutory Report of President on State of the Union

Dr. CAIRNS apologized for the late circulation of his report, caused by complications in his personal commitments. In presenting the report to Council, he emphasized that:

- the future well-being of the Union was critical to fulfilment of essential world needs rather than needs of world scientists
- the Scientific Unions must in future bear an important part of the burden for making possible the resolution of political tensions and human needs through science and technology
- some progress had been made in development of chemical science towards world needs (CHEMRAWN)
- the suggestion for an international chemical society might be met by individual memberships (Scientific Associates) of IUPAC
- initiatives had been taken in UK and USA to introduce younger chemists to the work of IUPAC Commissions.

The report was received with acclamation.

Minute 6 Biennial Report of Treasurer

The report of the Treasurer and the audited accounts for 1975–6 had been circulated before the Meeting. In spite of worldwide inflation and undiminished cost increases,

there was an excess of income over expenditure of US-\$25 519.43 in 1975 and of US-\$62 798.06 in 1976. Restrictions had been imposed on the money available for the traditional work in the Divisions, Commissions, and Committees, which had often proceeded with personal sacrifice. Funds had, however, been provided for some new and extended activities, such as CHEM-RAWN, in order to bring the activities of the Union into line with scientific progress and the needs of society.

Regrettably, some member countries with a major chemical industry had still not based their national subscription on chemical turnover nor joined the Company Associate Scheme. Prof. HORN urged all National Adhering Organizations to pay their annual subscription by 30th April each year. Unless Brazil paid its 1976 subscription before the end of this year, it would cease automatically to be a Member of the Union (Statute 9.2). Also, Arab Republic of Egypt, Argentina, Belgium, Bulgaria, Cuba, France, India, Venezuela, and Yugoslavia, who had not yet paid for 1977, would incur severe penalties if the position was not remedied by the start of 1978.

The Treasurer emphasized that the 1975 General Assembly (Conference) in Madrid had cost US-\$193 094.79, compared with the estimate of US-\$175 000. It was now urgent for the Union to consider restructuring of its biennial Assembly.

Dr. CAIRNS thanked the Treasurer for keeping down the expenses of the Union. Council *Resolved* unanimously:

that the audited accounts for 1975–6 be adopted.

On the recommendation of Prof. HORN, Council also *Resolved* unanimously:

that Neutra Treuhand AG be reappointed as auditor for IUPAC for the biennium 1977–8.

Minute 7 Report of Finance Committee

Although the finances of IUPAC were still in fairly good order, Dr. J. W. BARRETT said that the forward position was less promising. Investment income was being maintained at around US-\$32 000, but recommendations would be forthcoming through the Bureau to increase income from the National Adhering Organizations. Only a slight increase in income from Company Associates was evident over the past biennium. For the first time the 1975–6 accounts included subaccounts for publications and for contracts.

The President paid tribute to the strong support and guidance which he and his fellow Officers had received from Dr. BARRETT, who now retired from Chairmanship of the Finance Committee.

Minute 8 Tentative Budgets for 1978 and 1979

Two alternative balanced budgets for 1978 (as of 77.08.16) were brought before Council by the Bureau. Depending on whether Council decided to raise the national subscriptions in 1978, there would be either US-\$175 000 or US-\$200 000 available for travel, subsistence, and administration of IUPAC bodies. The budget for 1979 (as of 77.08.16) was only a first draft. It showed an excess of expenditure over income of US-\$34 300, which would be reduced to US-\$7 300 if national subscriptions were raised in 1978.

Voting on the budgets was deferred until the conclusion of Item 9 on the Agenda, when Council *Resolved* (106 in favour, 14 abstentions, 0 against):

that the budget for 1978 (Alternative II) and the tentative budget for 1979 be accepted.

Minute 9 Dues Structure and Fixing Annual Dues for 1978 and 1979

Council *Resolved* unanimously:

that the requests for transfer of Category from Austria (C to B1), Greece (D to C), German Democratic Republic (B1 to B2), Portugal (C to B1), and Venezuela (D to B1) be approved.

A document was considered from the Bureau, recommending an increase in national subscriptions to meet the inflationary costs of the Union. There had been no increase since 1974, despite continued inflation worldwide. In addition, Council was recommended to consider the necessary statutory changes in 1979 for introduction of mandatory allocation of membership categories in 1980, should all countries by then not have moved voluntarily into their suggested categories. It would still be possible for a country to choose a category higher than that corresponding to its annual chemical turnover.

Council *Resolved* (82 in favour, 38 abstentions, 0 against):

that the present minimum subscriptions for Categories A3-C (inclusive) be increased by 15% for 1978 onwards, but the subscription for Category D be set at US-\$400.

Council noted the recommendation on mandatory allocation of membership category and decided to invite National Adhering Organizations to submit their comments in writing by 1 February 1978. The comments would be considered by the Finance Committee at its meeting in February 1978, when the choice of chemical turnover as a criterion for the basis of IUPAC membership categories would be reviewed. The conclusions of the Finance

Committee would be forwarded to the Bureau for its meeting in September 1978.

Minute 10 Applications for Membership of IUPAC

Council *Resolved* (124 in favour, 4 abstentions, 0 against):

that the application for membership of the Union (Category C) by the Supreme Council of Sciences of the Syrian Arab Republic be accepted.

Minute 11 Applications for Associated Organization Status

On the recommendation of the Bureau (Minute 5/77, 37th Meeting – Warsaw), Council *Resolved* unanimously that:

- (i) applications for Associated Organization status of the Union from the International Association for Cereal Chemistry and from the International Commission on Application of the Mössbauer Effect be accepted;
- (ii) with the exception of the Association of Editors of European Chemistry Journals, the 20 independent bodies already enjoying the status of Associated Organizations of IUPAC be allowed to continue in that capacity for the next biennium;
- (iii) a decision regarding the Association of Editors of European Chemistry Journals be deferred until the Spring 1978 meeting of the Executive Committee to allow more time to obtain an activities statement from that body.

Minute 12 Reports of Division Presidents and Clinical Chemistry Section

The Division Presidents and the President of the Clinical Chemistry Section referred briefly to their precirculated reports of activity since the 28th Conference, then informed Council of the further progress made during the 29th General Assembly.

Dr. R. N. JONES said that the Physical Chemistry Division Committee had approved the establishment of subcommittees to prepare a survey on terminology in chemical kinetics, to collect and define uniquely terms in the field of intermolecular forces, and to deal with expression of uncertainties of experimental thermodynamic data. The preparation of books entitled *Thermodynamic Properties of Salts with Organic Anion or Cation* and *Correlation and Critical Evaluation of Thermodynamic Data* had been initiated. A programme was being started of recommendations on methods of physicochemical measurements with emphasis on the principles involved, sources of error, and limits of accuracy attainable by various

techniques. A provisional document had been completed on recommendations for presentation of Raman spectra in data collections. Final recommendations had been completed on reporting experimental data dealing with critical micellization concentrations and on selected definitions, terminology, and symbols for rheological properties.

In the Inorganic Chemistry Division, a new definition had been proposed of an atomic weight of an element. Following the regular element by element biennial review, changes were proposed for the atomic weight values of vanadium and lutetium.

Prof. H. ZOLLINGER emphasized that the Organic Chemistry Division policy of initiating and sponsoring IUPAC symposia of top scientific standard, was to be supplemented by a critical evaluation of these meetings by observers from the Division Committee. In addition to the traditional work on nomenclature of organic chemistry, progress had been made on terms, symbols, and guidelines for recording experimental data in photochemistry, and particularly on a glossary of terms used in physical organic chemistry. Steps were being taken to effect a closer collaboration with organic chemists in industry. There would be an initiative to organize symposia and conferences in new fields right at the very frontier of scientific knowledge. The Division hoped also to contribute to CHEMRAWN activities within the Union.

Prof. C. G. OVERBERGER brought up-to-date the precirculated details on forthcoming international meetings approved by the Macromolecular Division: Microsymposium on Polymer Dispersions, Dresden (GDR), 78.09.04–06; Symposium on Stereospecific Polymerization, Pisa (Italy), 80.09.08–15. A number of reports from Working Parties were in draft form: collaborative study on mechanical properties of rigid PVC – effect of fillers; collaborative study of effect of molecular orientation on mechanical properties of rubber modified polystyrene; collaborative study of melt rheology of a thermoplastic elastomer of the A–B–A block copolymer type.

In the absence of its President through illness, Prof. T. S. WEST gave a brief account of developments within the Analytical Chemistry Division at Warsaw. A thorough revision of the existing Division Rules had been completed. There was to be a redefinition of the objectives and priorities of the Division. A six-year programme was envisaged for revision, updating, and systematization of the *Compendium of Analytical Nomenclature*. Following experience of reviewing draft ISO international standards in recent years, dissatisfaction with some aspects of the collaboration would be referred for the attention of the Bureau. Coopted Members

to the Division Committee would be sought through ICAG and from bodies such as FECS and ISO. The Division had benefited already from operation of the young chemists scheme by UK and USA and hoped to see it extended to other countries in future.

Dr. H. EGAN said that the new IUPAC Statutes and Bylaws adopted by Council at Madrid had greatly affected the structure of the Applied Chemistry Division. In addition, the more recent views of the Executive Committee on the future of several Commissions in the Division was being met in spirit. The Titular Memberships of the two Food Commissions were being reduced, with the intention to form a single Commission on Food Chemistry in 1979. A similar amalgamation of the two Pesticides Commissions was also planned. The programmes of the Commissions on Air Quality and Water Quality had been strengthened, however, and these two Commissions should remain separate. A subcommittee had been set up to identify neglected areas and to propose new projects of industrial or environmental interest to the Division.

Prof. P. LOUS stressed that there was nearing completion in the Clinical Chemistry Section a very detailed proposal for a scheme or curriculum for university courses in clinical chemistry. Such a scheme had been requested by institutions and organizations particularly in developing countries. Activities in problems related to toxicology of heavy metals and to cholinesterase-inhibitors were being broadened, a substantial part of the endeavours being in the chemistry of biological monitoring related both to industrial toxicology and to urban pollution.

Dr. CAIRNS pointed out that all six Division Presidents and the President of the Clinical Chemistry Section were retiring from office at Warsaw. Council gave a hearty vote of thanks for their efforts on behalf of the Union.

Minute 13 Report of Committee on Publications

The new Chairman of the Committee on Publications, Dr. H. GRÜNEWALD, was unable to be present and Prof. G. OURISSON reported briefly on the deliberations of the Committee at Warsaw. He indicated that important progress in reorganization of the publications structure of the Union had been made. The final royalty provided by Pergamon Press for 1976 was nearly 10% higher than the minimum guaranteed royalty of US-\$40 000. It was strongly recommended for IUPAC to start in 1979 a new monthly news journal to replace the present *Information Bulletin* (and Appendixes) and Part B of the

Comptes Rendus. For 1978 an attempt should be made to incorporate into the present Bulletin the material normally issued as Appendixes thereto and as Part B of the *Comptes Rendus* from the Warsaw General Assembly. Conversion to publication via camera-ready copy supplied by authors, instead of by traditional typesetting methods, was well advanced for all IUPAC publications, particularly *Pure and Applied Chemistry (PAC)*. From the start of 1978 it was intended to publish those symposia papers available for each issue of *PAC*, rather than include all papers from a particular symposium in the same issue. It would be left for Pergamon to decide whether to publish subsequently a hardbound offprint from a symposium spread out over several issues of the journal. Nonsymposium review articles might also be solicited for *PAC*.

In answer to a question from the UK Delegation (Prof. N. N. GREENWOOD), Prof. OURISSON stressed that nomenclature and other reports from Commissions would continue to be published in *PAC*. The Israeli Delegation (Prof. D. LAVIE) said that the organizers of some IUPAC-sponsored symposia would like to publish the main lectures in national journals rather than in *PAC*. Each case was judged on its merits by the Committee on Publications according to Prof. OURISSON. With the change to a camera-ready copy publication system, putting more responsibility on authors of manuscripts, the Yugoslav Delegate (Prof. B. TEZAK) thought that it was opportune for IUPAC to review the restrictions imposed by copyright for reproduction from *PAC*. In his opinion full encouragement should be given for the dissemination of scientific information by allowing more liberal use of new instrumentation and methods. There was support for this view from other Delegations and Dr. CAIRNS agreed that the matter should be referred for the attention of the Committee on Publications.

Minute 14 Report on CHEMRAWN Activities

Dr. B. W. ROSSITER said that the main purposes of CHEMRAWN were:

- (i) to identify human needs amenable to satisfaction through chemistry with particular attention to needs of global or multinational dimension;
- (ii) to provide a nonpolitical, international forum for the gathering, discussion, advancement, and dissemination of chemical knowledge deemed useful for improvement of man and his environment;
- (iii) to provide an international, non-governmental source of information for benefit of research institutions, national governments, and inter-

national agencies with respect to chemistry and world needs.

Since Madrid a CHEMRAWN Planning Committee had been formed by IUPAC and the first major enterprise was being organized, a World Conference on Future Sources of Organic Raw Materials (Toronto, 78.07.10–13). Subject to a satisfactory evaluation of the Toronto Conference, the next major project would be a conference on chemistry, agriculture, and world food supply during the 1980–1 time period.

Minute 15 Proposals Formally Received from National Bodies

A proposal had been received from the Canadian National Committee (letter of 77.03.08) for IUPAC to establish a Commission on Radiation Chemistry. Council accepted the recommendation of the Bureau (Minute 6/77, 37th Meeting—Warsaw) that the proposal be referred for consideration by the Physical Chemistry Division, in conjunction with other relevant Divisions of the Union, which should report back on whether and how the matter should be handled within IUPAC. To some extent the proposal overlapped that from Israel in 1972 for establishment of a Division of Nuclear and Radiochemistry. After prolonged consideration the Israeli proposal was being realized, in modified form, by widening the terms of reference of the existing Commission on Analytical Radiochemistry and Nuclear Materials (Analytical Chemistry Division).

Minute 16 Adoption of Nomenclature Recommendations

On the proposal of IDCNS, Council *Resolved* (128 in favour, 2 abstentions, 0 against) that the following final recommendations on nomenclature and symbols be adopted by IUPAC:

Physical Chemistry Division

- (i) Expression of Results in Quantum Chemistry (Commission on Physico-chemical Symbols, Terminology, and Units—Provisional Nomenclature Appendix No. 49, September 1976, to *Inf. Bull.*)
- (ii) Recommendations for Presentation of Infrared Absorption Spectra in Data Collections—A. Condensed Phases (Commission on Molecular Structure and Spectroscopy—Provisional Nomenclature Appendix No. 50, September 1976, to *Inf. Bull.*)
- (iii) Symbolism and Nomenclature for Mass Spectroscopy (Commission on Molecular Structure and Spectroscopy—Provisional Nomenclature Appendix No. 51, September 1976, to *Inf. Bull.*)
- (iv) Definition and Symbolism of Molecular Force Constants (Commission on

Molecular Structure and Spectroscopy—Provisional Nomenclature Appendix No. 56, December 1976, to *Inf. Bull.*)

Inorganic Chemistry Division

Recommendations for Naming of Elements of Atomic Numbers Greater than 100 (Commission on Nomenclature of Inorganic Chemistry—Provisional Nomenclature Appendix No. 55, December 1976, to *Inf. Bull.*)

Analytical Chemistry Division

- (i) Recommendations on Nomenclature of Scales of Working in Analysis (Commission on Analytical Nomenclature—Tentative Nomenclature Appendix No. 18, February 1972, to *Inf. Bull.*)
- (ii) Usage of Terms 'Equivalent' and 'Normal' (Commission on Analytical Nomenclature—Provisional Nomenclature Appendix No. 36, August 1974, to *Inf. Bull.*)
- (iii) Guide to Trivial Names, Trade Names, and Synonyms used in Analytical Chemistry (Commission on Analytical Nomenclature—Provisional Nomenclature Appendix No. 45, September 1975, to *Inf. Bull.*)
- (iv) Compendium of Analytical Nomenclature (comprising various final nomenclature recommendations of the Analytical Chemistry Division already published in *Pure Appl. Chem.*)

Clinical Chemistry Section

Recommendations 1977 on Quantities and Units in Clinical Chemistry and for List of Quantities in Clinical Chemistry (minor revisions and corrections to Recommendations 1973)

On the proposal of the Bureau (Minute 11/77, 37th Meeting—Warsaw), Council *Resolved* unanimously:

that, in order to expedite publication of final recommendations on nomenclature and symbols between General Assemblies, unless there are unresolved matters of controversy its authority (Bylaw 2.11) for adoption be delegated to IDCNS.

Minute 17 Proposals for New Bodies and Dissolution of Existing Bodies

Following the recommendations of the Bureau (Minute 5/77, 37th Meeting—Warsaw), which had been distributed to all Delegations, Council *Resolved*:

- (i) to dissolve the Interdivisional Committee on Machine Documentation, whose remit was not sufficiently well defined or well conceived, the problem area which IUPAC was trying to tackle

being too broad to be dealt with by a single body with single remit (124 in favour, 0 abstentions, 6 against).

- (ii) to create a Standing Committee on Chemistry and Industry to guide and inform Company Associates on IUPAC programmes and policies, to establish important areas of chemical science in IUPAC related to ongoing industrial needs, and to put industry enquiries on major chemical matters (122 in favour, 8 abstentions, 0 against).

Replying to a question from the Israeli Delegation, Dr. CAIRNS said that 'region' under composition of the new Standing Committee referred to Scandinavia, where Company Associates were being recruited on a regional rather than national basis. Following suggestions from the Delegation of Federal Republic of Germany (Prof. D. BEHRENS) in connexion with propositions for candidates, Council decided that the composition should state "Candidates for Chairmanship and Members . . .", but that the Chairman should be appointed by the President of the Union in consultation with the Executive Committee rather than by the Standing Committee itself.

- (iii) to reduce to 6 the Titular Memberships of the Commissions on Food Additives and on Food Contaminants, these two bodies to be combined into a Commission on Food Chemistry in 1979 (unanimous resolution)

- (iv) to change the names of the following bodies (unanimous resolution)

Commission on Thermodynamics and Thermochemistry to Commission on Thermodynamics

Commission on Food Additives to Commission on Food Properties

Commission on Oils and Fats to Commission on Oils, Fats, and Derivatives

Commission on Air Quality to Commission on Atmospheric Environment

- (v) to allow all existing Commissions of the Union to continue for the next two years (Bylaw 4.302).

Minute 18 Ratification of Decisions taken by Bureau and Executive Committee since 28th Conference

All decisions taken by the two bodies since those approved by Council at Madrid (Minute 20/75, 28th Meeting), were contained in the Minutes of the 34th–36th Bureau and 83rd–87th Executive Committee Meetings. These minutes had been distributed to all National Adhering Organizations.

Council *Resolved* (118 in favour, 12 abstentions, 0 against):

that the decisions taken by the Bureau and Executive Committee since the 28th Conference be declared ratified.

Minute 19 Important Matters Discussed by Executive Committee and Bureau at 29th General Assembly Not Covered by Items on Council Agenda

In view of increasing financial costs to the Union, higher organizational workload for the Secretariat, greater commitment for the host country, and heavy pressures on several participants for a 10-day schedule, Dr. CAIRNS said it was necessary to reconsider the present policy for all IUPAC bodies to meet at the General Assembly in the year in which it was held. The Executive Secretary had been asked by the Executive Committee at Warsaw (Minute 22/77, 88th Meeting) to prepare a paper on the basis of a minimum schedule (4–5 days to cover meetings only of Division Presidents, Division Committees, Executive Committee, Bureau, and Council), with financial evaluation, for consideration at its Spring 1978 meeting. Subsequently the paper might be circulated for comment by Division Committees and Commissions, then be discussed by the Bureau in September 1978. Any change in the present format of the General Assembly could probably not be introduced before 1981.

Minute 20 Elections

There were 29 Delegations present with Category A3–C (inclusive) membership, constituting a total of 130 votes, and 2 Delegations with Category D membership (nonvoting on nonscientific matters).

20.1 Vice-President

In a written and secret ballot for Prof. H. ZOLLINGER (Switzerland).

124 in favour

0 against

0 abstentions

1 spoiled ballot paper

Total voting 130, simple majority 66.

Prof. ZOLLINGER was declared the elected Vice-President, the result being greeted with acclamation by Council.

20.2 Elected Members to Bureau

The President ruled that the statement in Statute 7.2

"No Adhering Organization shall have more than one Elected Member on the Bureau, and the principle of fair geographical representation of Members shall be taken into account"

did not apply to additional candidates nominated by the Bureau, but only to candidates nominated by the Adhering Organizations. Therefore, Sir DEREK BARTON was to be labelled as “(Bureau)” rather than “(France)”. In order to clarify the situation for the future, Dr. CAIRNS proposed that an *ad hoc* Committee be appointed to consider this specific problem and to report back to the Bureau in 1978, recommending any necessary statutory changes. His suggested composition for the *ad hoc* Committee was: Sir HAROLD THOMPSON (Convenor), Prof. J. BÉNARD and Prof. M. MANDEL.

In a written and secret ballot for 7 vacancies:

| | |
|---------------------------------|-----|
| Prof. C. G. OVERBERGER (USA) | 122 |
| Prof. J. MICHALSKI (Poland) | 108 |
| Prof. A. KJAER (Denmark) | 92 |
| Dr. J. W. BARRETT (UK) | 88 |
| Prof. A. R. H. COLE (Australia) | 84 |
| Prof. C. N. R. RAO (India) | 84 |
| Prof. Sir DEREK BARTON (Bureau) | 68 |
| Prof. E. FLUCK (FRG) | 62 |
| Prof. R. TRUHAUT (France) | 54 |
| Prof. V. GUTMANN (Austria) | 44 |
| Prof. L. MALATESTA (Italy) | 44 |
| Dr. D. B. TONKS (Canada) | 32 |
| Prof. D. LAVIE (Israel) | 28 |

Total voting 910, simple majority 66.

The 7 vacancies were declared to be filled by Dr. BARRETT, Sir DEREK BARTON, Prof. COLE, Prof. KJAER, Prof. MICHALSKI, Prof. OVERBERGER and Prof. RAO.

20.3 Officers of Divisions and Clinical Chemistry Section

The following elections of Officers were approved unanimously by Council (Bylaw 4.104):

(i) Physical Chemistry Division

President (1977 – 1979)
– Prof. S. SUNNER (Sweden)
Vice-President (1977 – 1979)
– Prof. E. U. FRANCK (FRG)
Secretary (1977 – 1981)
– Dr. D. AMBROSE (UK)

(ii) Inorganic Chemistry Division

President (1977 – 1981)
– Prof. N. N. GREENWOOD (UK)
Vice-President (1977 – 1981)
– Prof. A. A. VLČEK
(Czechoslovakia)
Secretary (1977 – 1981)
– Prof. KAZUO SAITO (Japan)

(iii) Inorganic Chemistry Division

President (1977 – 1979)
– Prof. P. YATES (Canada)
Vice-President (1977 – 1979)
– Prof. S. ITÔ (Japan)
Secretary (1977 – 1979)
– Prof. J. MATHIEU (France)

(iv) Macromolecular Division

President (1977 – 1981)
– Prof. V. A. KABANOV (USSR)
Vice-President (1977 – 1981)
– Prof. C. H. BAMFORD (UK)
Secretary (1975 – 1979)
– Prof. A. J. de VRIES (France)

(v) Analytical Chemistry Division

President (1977 – 1981)
– Prof. T. S. WEST (UK)
Vice-President
– Past-President Prof. N. TANAKA
(Japan) acting as Vice-President for
1977 – 1979)
Secretary (1975 – 1979)
– Dr. J. C. WHITE (USA)

(vi) Applied Chemistry Division

President (1977 – 1981)
– Prof. H. SUOMALAINEN
(Finland)
Vice-President (1977 – 1981)
– Dr. A. F. LANGLYKKE (USA)
Secretary (1977 – 1981)
– Dr. R. MARCUSE (Sweden)

(vii) Clinical Chemistry Section

President (1977 – 1979)
– Dr. M. ROTH (Switzerland)
Vice-President (1977 – 1979)
– Dr. R. GRÄSBECK (Finland)
Secretary (1977 – 1981)
– Dr. M. K. SCHWARTZ (USA)

Minute 21 Ratification of Dates and Place of 30th General Assembly and 27th Congress

21.1 30th General Assembly

On the recommendation of the Bureau (Minute 5/77, 37th Meeting – Warsaw), Council *Resolved* unanimously:

that the 30th IUPAC General Assembly be held at Davos in 1979.

It was noted that the cheaper hotel prices at Davos would tend to be offset by the costs to transport participants from Zürich airport to Davos. With regard to the provisional dates of 3–12 September 1979, the Delegation from Federal Republic of Germany (Dr. W. FRITSCHKE) asked if a clash could be avoided with a meeting of Gesellschaft Deutscher Chemiker already planned for 10–14 September 1979. Dr. CAIRNS also suggested that it be checked if there was any clash with the Fall 1979 meeting of the American Chemical Society. On behalf of the Swiss organizers for the General Assembly, Prof. H. ZOLLINGER promised to look into these matters.

21.2 27th Congress

Council *Resolved* unanimously:

that the 27th IUPAC Congress be held at Helsinki during the period 27–31 August 1979,

and the scope of the scientific programme, as indicated in the first circular, was approved (Statute 13.1). Attention was drawn by the Delegation from Federal Republic of Germany (Prof. D. BEHRENS) to a clash between the section on biotechnology and the 1st European Congress on Biotechnology being organized by DECHEMA (Interlaken, 78.09.25–28).

Minute 22 Place of 31st General Assembly and 28th Congress

22.1 31st General Assembly

Formal invitations had been received for the 1981 Assembly to be held in Belgium (letter dated 77.04.08) and in Canada (letters dated 77.03.08 and 77.07.08). On the recommendation of the Bureau (Minute 5/77, 37th Meeting—Warsaw), Council *Resolved* unanimously:

that the invitation from Comité National Belge de Chimie be accepted for the 31st IUPAC General Assembly to be held in Belgium in 1981, but that the location be Leuven and not Brussels.

Prof. G. SMETS advised that the best time for the Assembly would be early September 1981. The Delegation from Federal Republic of Germany (Dr. W. FRITSCHÉ) asked that a clash be avoided with the meeting of Gesellschaft Deutscher Chemiker traditionally held in mid-September.

22.2 28th Congress

Council *Resolved* unanimously:

that the offer of the Canadian National Committee to host the 18th IUPAC Congress at Vancouver in 1981 be accepted.

The Australian Delegation (Prof. A. R. H. COLE) asked that there should be as little separation as possible between the dates for the Congress and the 31st General Assembly. The Canadian Delegation (Dr. H. B. MARSHALL) indicated that the Congress would be held provisionally during the second half of August 1981.

Minute 23 Any Other Business (Discussion only)

Prof. S. SHIBATA presented a short status report on arrangements for the 26th IUPAC Congress (Tokyo, 77.09.04–10).

The USA Delegation (Dr. B. W. ROSSITER) said that, due to some uncertainties, it had inadvertently abstained when the vote was taken on ratification of decisions by the Bureau and Executive Committee (see Minute 18/77). It now wished to be recorded as “in favour”, and this was accepted by Council (amended voting: 124 in favour, 6 abstentions, 0 against).

Votes of Thanks

On behalf of the Union, Prof. HORN thanked the Polish National Committee for Chemistry for the excellent support given to IUPAC in connexion with its 29th General Assembly. Special thanks were expressed to:

Prof. W. TRZEBIATOWSKA

—President, Polish Academy of Sciences

Prof. J. MICHALSKI

—Secretary, Science Division of Polish Academy of Sciences

Prof. W. ZIELENKIEWICZ

—Chairman, Polish Organizing Committee for the General Assembly

Prof. A. BIELANSKI

—Chairman, Polish National Committee for Chemistry

Dr. S. MALANOWSKI

—Secretary, Polish National Committee for Chemistry and Polish Organizing Committee for the General Assembly

In handing over the Presidency of the Union, Dr. CAIRNS recalled that he had met Prof. SMETS at the formative meeting of the Macromolecular Division several years ago. Prof. SMETS had proved to be an able first Secretary of that Division and more recently had served IUPAC well through membership of the Bureau and Executive Committee. A hearty vote of thanks from Council to Dr. CAIRNS for his leadership of the Union over the past two years was led by the incoming President.

REPORTS OF IUPAC BODIES

COMMISSION ON TOXICOLOGY IN CLINICAL CHEMISTRY (CToCCS)

Meeting at Monte Carlo (Monaco):
28 February and 5 March 1977

1. *Introductory Business.* The meeting of the Commission was convened on 28 February 1977 at the Hermitage Hotel. Dr. SUNDERMAN occupied the Chair, and he opened the session with a cordial welcome. The minutes of the meeting of the Commission on Toxicology in Farmington, Connecticut, USA on 2–3 December 1977 were adopted.
2. *Monte Carlo Symposium on Toxic Metals.* Last minute changes in the scientific programme and budget for the Symposium were discussed and adopted, and the protocol of the Opening Ceremony was formulated.
3. Dr. J. SAVORY and Dr. S. S. BROWN agreed to work with Dr. MERCIER in organizing the projected ComTox Symposium on Gas Chromatography/Mass Spectrometry of Toxic Agents in Body Fluids which will be held in Brussels during June 1980.
4. Dr. SUNDERMAN agreed to write to Dr. H. SOUMALAINEN (Finland), who is Program Chairman of the 1979 IUPAC Congress in Helsinki, offering his assistance in obtaining papers that pertain to toxicology.
5. Dr. BROWN reported that the Subcommittee on Cholinesterase was functioning smoothly in drafting the monograph, which will hopefully be published in the series *Advances in Clinical Chemistry*.
6. Dr. SUNDERMAN reported that the Nickel Subcommittee had accomplished three interlaboratory comparisons of nickel analyses in body fluids, and was making steady progress in efforts to develop a reference method for electrothermal atomic absorption spectrometry of nickel.
7. Mr. P. BROWN and Dr. S. S. BROWN discussed plans for rapid publication by Elsevier Ltd. of the Proceedings of the Toxic Metals Symposium.
8. Dr. SUNDERMAN noted that IUPHAR was organizing a Section of Toxicology, and he emphasized the desirability of establishing a liaison and possibly developing joint activities. Dr. SUNDERMAN agreed to invite Dr. ZBINDEN, Chairman of the IUPHAR Section of Toxicology, to attend the Commission meeting in Warsaw.
9. The Commission reaffirmed its request to the Section on Clinical Chemistry and to the IUPAC Bureau for authorization to increase the number of Titular Members from 4 to 5, commencing at the Warsaw meeting in August 1977.
10. The Commission formally approved the slate of nominees for membership on the Commission on Toxicology.

11. The Commission reaffirmed the following schedule for meetings during 1977 and 1978 – Warsaw, Poland: 13–15 August 1977; Mexico City, Mexico: 25 February 1978; and Kristiansand, Norway: 24–26 May 1978.
12. The Commission formulated its budget request to the Section on Clinical Chemistry and the IUPAC Bureau.

Present: F. W. SUNDERMAN, Jr. (USA) – Chairman, S. S. BROWN (UK) (Titular Member, ComTox), R. BOURDON (France) (Titular Member, ComTox), D. B. TONKS (Canada) (Associate Member, ComTox), J. SAVORY (USA) (Associate Member, ComTox), M. STOEPLER (Germany), R. RATCLIFFE (UK) (Representative of TransWorld Conference Organizers, Ltd.), P. BROWN (UK) (Representative of Elsevier Ltd).

MACROMOLECULAR DIVISION WORKING PARTY ON SUPPORTED POLYMER FILMS (WPSPF)

Meeting at Eastbourne (UK): 15–16 June 1977

1. *Minutes of Previous Meeting.* The minutes of the meeting held at Stuttgart (Germany) 11–12 March 1976 were formally accepted without comments.
2. *Membership.* Because of retirement, WAPLER and HAMANN left the group and SICKFELD and DULOG took over their position. Contacts shall be sought with the Netherlands and Scandinavian research institutes in order to find new ways for their cooperation. Membership from American experts would also be welcomed, the pertinent situation is examined by GLASER.
3. *Progress Reports*
 - (a) *Analytical group.* The state of affairs with the current project, 'Analysis of Functional Groups in Amino Resins' was reviewed by CHRISTENSEN, the group leader. A literature report on this item had been worked out. Furthermore, the methods to be tested in co-operative investigations were selected. Various methods for solvent removal, by freeze drying, precipitation or otherwise, are to be considered. For the analysis of functional groups, especially alkoxy, methylol, imino and amino groups, NMR spectroscopy as well as GLC, combined with other analytical means, shall be applied. As standard samples for co-operative testing, four model substances and three commercial products shall be selected. Schedule of test and samples are to be prepared by November 1977.

(b) *Adhesion group.* Three directions are of interest in the group, according to the report of its leader ZORLL. More knowledge is necessary as to the effect of geometrical factors, such as film thicknesses, loaded area of film, rate of loading etc. The differences between results obtained by various procedures of measurement are likewise to be studied. Finally, structural elements of the film, i.e. polymer type, pigmentation and their concentration, must be investigated with respect to the influence exerted on adhesion. A report on experimental studies, given by SICKFELD, with reference to the applicability of the pull-off and the torque-wrench method, did not reveal any advantage of either procedure. Additionally, van LAAR presented results of tests with the blister method and controls of filiform corrosion phenomena. A close relationship between the pertinent data could be established. The correlation of adhesion test results and coating behaviour in practice is of such interest that the experience existing shall be collected by means of a questionnaire action.

(c) *Solvent polymer interaction group.* The necessity of this programme results from the cautious point of view that is now observed in terms of solvent use in the paint and printing ink field, even in the case of mainly water-based materials. A successful way to tackle these problems may be to look at such phenomena as either cage or solvation effects, as encountered with solvent retention, and additionally to study the permeabilities of polymer films with respect to volatile substances. These aspects are to be considered as basis for a new working programme for which KAMBANIS will prepare a practical guideline.

(d) *Literature retrieval group.* More information concerning literature services in the coatings and printing ink field has been compiled according to the group leader's report. In this context, RAASCHOU-NIELSEN pointed to the difficulties in obtaining such data from various countries. It is hoped, however, to finalize the project in due course on the basis of the material received by August 1977.

4. *Future Projects.* The discussion about potential fields of investigations revealed interests in studies about swelling properties, behaviour of polymers in bulk and as thin films, adsorption sites of pigments and related phenomena. Suitable items for new work could also be the rheological behaviour of high-solids paint material, the compatibility of amino resins with other polymers, and the specific effects of functional groups within the film.

5. *Publication.* All results of work shall be made available in journals providing for widespread dissemination, but possibly also in other languages than English. The patronage of the SPF Working Party should be secured.

6. *Next Meeting.* Meetings can either be organized in context with general conferences or as special manifestations. As date for the next meeting in either case, June or July 1978 (with October as a second choice) is envisaged, the meeting place would be Brussels or Copenhagen.

Present: A. BERGE, M. CHIAVARINI, G. CHRISTENSEN, P. FINK-JENSEN (Chairman), M. A. GLASER, K. HAMANN, S. M. KAMBANIS,

K. M. OESTERLE, L. A. O'NEILL, H. K. RAASCHOU NIELSEN, J. SICKFELD, A. TOUSSAINT, J. A. W. van LAAR, J. P. VOLLMER, U. ZORLL (Secretary).

COMMISSION ON NOMENCLATURE OF ORGANIC CHEMISTRY (CNOC)

**Meeting at Jablonna Palace (Poland):
5–10 August 1977**

1. *Minutes of Previous Meeting.* The minutes of the meeting held at Deauville, France on 5–12 September 1976 had been sent to the IUPAC Secretariat in Oxford in December 1976.

2. *Section E: Stereochemistry.* Prof. VÖGTLE was designated as convenor of the reorganized working group on stereochemical nomenclature and he has circulated a document outlining problems to be treated in the extension of Section E.

3. *Section F: Natural Products and Related Compounds.* Section F has been published as Provisional Nomenclature Appendix No. 53 (December 1976) to *Inf. Bull.* CNOC thanked Dr. L. C. CROSS and Prof. W. KLYNE for the large part they had in the completion of this project. Dr. K. BLAHA was appointed to collect and evaluate comments on Section F.

4. *Section G: Systematic Substitutive Nomenclature.* This project has as its purpose the revision and reorganizing of nomenclature rules of organic chemistry to improve their consistency and simplify their application. The work was sponsored by the chemical societies of the Federal Republic of Germany, France, United Kingdom and USA. The work was conducted at Chemical Abstracts Service under the direction of Dr. H. GRÜNEWALD, convenor of the working group, and Dr. K. L. LOENING. Dr. GRÜNEWALD presented the complete report on this project to Prof. LOZAC'H who in turn presented it to IUPAC President CAIRNS. Parts of Section G will be readied for publication in the next year. Working parties have been established in those areas where problems were found.

5. *Section H: Isotopically Modified Compounds.* Section H has been published as Provisional Nomenclature Appendix No. 62 (July 1977) to *Inf. Bull.* CNOC gratefully acknowledges the work of Prof. J. RIGAUDY and Dr. W. H. POWELL, collators for Section H. Prof. RIGAUDY will collect and evaluate comments on Section H prior to publication in *Pure Appl. Chem.*

6. *Nodal Nomenclature.* CNOC agreed that the document on nodal nomenclature is to be revised and sent to Dr. GRÜNEWALD for publication in *Angew. Chem.* with Prof. N. LOZAC'H, Dr. W. H. POWELL and Dr. L. A. GOODSON as co-authors. CNOC encourages publication of complementary ideas.

7. *Hantzsch-Widman Names.* A revision of the Hantzsch-Widman nomenclature is to be distributed to CNOC before its publication in the *Inf. Bull.*

8. *Biochemical Nomenclature*. LIPIDS. Nomenclature of Lipids has been published in *Lipids*, Vol. 12, No. 6, pp. 455–468 (1977). Publication in the *Inf. Bull.* will follow. PHOSPHO ESTERS. Phosphorus Compounds of Biochemical Interest has been published in *Proc. Natl. Acad. Sci., USA*, Vol. 74, No. 6, pp. 2222–2230 (June 1977). Publication in *Inf. Bull.* will follow. TETRAPYRROLES. Dr. K. L. LOENING is to collate comments received and submit this document to Oxford for publication in *Inf. Bull.* CARBOHYDRATES. Prof. B. G. LINDBERG has been named convener of the working group on carbohydrate nomenclature. AMINO ACIDS. Dr. K. BLAHA was designated as collator for comments on PNA No. 46 to *Inf. Bull.* He will circulate the revised document to JCBN for approval and then to Oxford for publication in *Pure Appl. Chem.*

9. *Joint CNOC–CNIC Meeting*. A joint session was held in Jablonna to discuss topics of mutual interest including nodal nomenclature, lambda convention and Section G. Oxynane was agreed as a parent hydride name in place of oxidane for HOH. Hydra was agreed as a replacement term for hydrogen. In Section H *unf* for uniform and *gen* for general labelling were proposed to replace U and G. It was agreed not to publish Section D in *Pure Appl. Chem.* at this time because a number of problems need further study.

10. *Membership*. Three vacancies in titular membership were created by the retirement of Dr. L. C. CROSS, Dr. H. GRÜNEWALD and Prof. N. LOZAC'H. Prof. W. KLYNE, Dr. G. P. MOSS and Prof. F. VÖGTLE were nominated as Titular Members. The following were nominated as Associate Members: Prof. O. ACHMATOWICZ, Dr. L. C. CROSS, Dr. S. HAMMERUM, Prof. N. LOZAC'H, Dr. A. McNAUGHT.

11. *Next Meeting*. The 1978 meeting of CNOC is planned either for the period 20–27 August in Columbus, Ohio or 6–11 September in Prague.

Present: Prof. N. LOZAC'H (Chairman), Mr. S. P. KLESNEY (Secretary), Dr. K. BLAHA, Dr. H. GRÜNEWALD, Dr. K. L. LOENING, Prof. J. RIGAUDY (Titular Members); Dr. J. H. FLETCHER, Dr. W. H. POWELL, Prof. J. C. RICHER (Associate Members); Prof. K. A. JENSEN (Observer, CNIC), Prof. O. ACHMATOWICZ (Poland), Dr. S. HAMMERUM (Denmark), Dr. A. McNAUGHT (UK) (Observers).

COMMISSION ON NOMENCLATURE OF INORGANIC CHEMISTRY (CNIC)

Meeting at Jablonna Palace (Poland):
9–14 August 1977

1. *Minutes of the Previous Meeting*. The minutes of the previous meeting (20–24 September 1976) were accepted with one amendment.

2. *Membership*. Dr. LEIGH and Dr. MINGOS were recommended as Titular Members for a further term of

four years. Prof. VLČEK and Prof. RIESS retired from Associate Membership and Prof. JENSEN and Prof. YAMASAKI were recommended as Associate Members for a further term of four years. Drs. COYLE, REEDIJK and SAMUEL were recommended to fill the vacancies in the Associate Membership. Prof. BUSCH and Prof. KLIKORKA were recommended as Associate Members for appointment after the Bureau had approved the expansion of the Associate Membership of the Commission to 12 members. Dr. FODORCSANYI was confirmed as the National Representative for Hungary.

3. *Guide to the Red Book*. It was noted that the Guide to the Red Book, 'How to Name an Inorganic Substance' has been published.

4. *Names of the Heavy Elements*. Comments on the provisional document were considered and a definitive document was approved for submission to the Division President. It was decided that the approved trivial names of elements 101, 102 and 103 should be retained with the systematic names as the minor alternatives, and that the approved symbols Md, No, and Lr for these elements should be retained as the only approved symbols. Prof. CHATT was to provide some explanatory notes for publication with the definitive rules.

5. *Isotopically Modified Compounds*. This document which is to be regarded as an additional chapter of the Red Book will be submitted to the Division President for publication during the coming year. The Commission recommended that the final version of the document contain a wider range of examples, and not use the abbreviation U to indicate uniform isotopic substitution.

6. *The Nomenclature of Hydrides of Nitrogen and Derived Cations, Anions and Ligands*. This document was approved for publication subject to some amendments.

7. *Multiplicative Infixes*. It was decided not to encourage the use of multiplicative infixes in additive nomenclature to indicate ionic charge.

8. *Designation of Co-ordination Sites in Ligands*. This topic was discussed and its difficulties defined.

9. *Heteropolyacid Nomenclature*. Prof. JEANNIN introduced a document on the nomenclature of heteropolyacids which met with the general approval of the Commission. It was decided that the document be redrafted in the light of the Commission's comments and then circulated to workers in the field for their comments.

10. *Nomenclature of Inorganic Polymers*. The Commission recommended that the names used for inorganic polymers in the document 'A Structure Based Nomenclature for Polymers II', prepared by the ACS Polymer Nomenclature Committee, should adhere more closely to the current IUPAC nomenclature practices and cite the backbone units in their order of occurrence in the constitutional repeat unit. Dr. POWELL will ask the Chairman of the ACS Polymer Division Nomenclature Committee to

nominate a member for the CNIC working party on inorganic polymers.

11. *Metal Centred Radical Names.* Dr. LEIGH's document on the use of 'Io metal centred radical names' was discussed and their use defined. Dr. LEIGH was requested to prepare a shorter document.

12. *Nomenclature of Iron—Sulphur Proteins.* The Commission recommended several amendments to the JCBN document on the Nomenclature of Iron—Sulphur Proteins which would make it conform more closely to current IUPAC practices.

13. *Ring and Chain Nomenclature.* The working party dealing with this topic will be examining the possibility of extending Prof. LOZAC'H's nodal concepts to the field of inorganic ring and chain compounds.

14. *Boron Nomenclature.* Dr. POWELL reported that he hopes to complete a draft of the boron nomenclature document in time for next year's meeting.

15. *Nomenclature of Coordination Stereoisomers.* A working party will hold its first meeting on 20 August in Copenhagen.

16. *Polyhedral Nomenclature.* Dr. MINGOS reported that a document on the numbering of idealised polyhedral skeletons had now been completed, and its conclusions would be incorporated into a general document on polyhedral nomenclature in time for the next meeting.

17. *Revision of the Red Book.* Dr. LEIGH outlined the programme for the revision of the Red Book.

18. *Joint CNIC-CNOC Meeting.* At a joint session the following topics of mutual interest were discussed: nodal nomenclature, names of binary hydrides, the development of Hantzsch-Widman names for bridging hydride bonding situations, and isotopically modified compounds. It was decided not to publish Section D in *Pure Appl. Chem.* at this time because a number of problems required further study.

19. *Next Meeting.* The 1978 meeting of CNIC is planned for 10–15 September.

Present: Prof. J. CHATT (Chairman), Prof. Y. JEANNIN (Vice-Chairman), Dr. D. M. P. MINGOS (Secretary), Prof. L. F. BERTELLO, Dr. K.-Ch. BUSCHBECK, Dr. G. J. LEIGH, Prof. B. MYASOEDOV, Dr. W. H. POWELL (Titular Members), Prof. W. C. FERNELIUS, Prof. K. A. JENSEN, Prof. K. YAMASAKI (Associate Members), Dr. T. D. COYLE (National Representative), Dr. E. SAMUEL, Dr. P. FODOR-CSANYI, Dr. W. J. EVANS and Dr. E. R. SMITH (Observers).

COMMITTEE ON TEACHING OF CHEMISTRY (CTC)

Meeting at Ljubljana (Yugoslavia):
14, 30–31 August 1977

1. *Composition of the Committee.* The Chairman welcomed Dr. T. M. SUGDEN to his first meeting and Dr. K. V. SANE who had been awarded a IUPAC–Ciba Bursary in order to attend the meeting. The Chairman and Committee wished to record their thanks to Mr. D. G. CHISMAN for his work as Secretary for 1966–76.

2. *Minutes of Previous Meeting and Matters Arising.* Minutes of the previous meeting of the Committee held in Frankfurt, 18–19 June 1976 (see *Inf. Bull.* 52/53, pp. 58–64) were approved. Among the points discussed were (i) The Committee thanked UNESCO for its continuing support. Dr. DONTSOV (UNESCO) assured the Committee of support for the publication of the *Newsletter* in the future. (ii) The *Sourcebook of Chemical Experiments* based on the University Laboratory Workshop, Seoul, August 1975, had now been published by the Korean Chemical Society on behalf of IUPAC/UNESCO. The Sourcebook was also available in Spanish translation as *Manual de Experimentos Quimicos*. (iii) the ALECSO Regional Meeting on Chemical Education was held in Alexandria, November 1976. The title was The Improvement of Chemical Education in the Arab Region. Thirty-one participants from the region took part, and the meeting was concerned principally with immediate pre-university curricula. Three of the four visiting speakers were invited via IUPAC and Dr. DONTSOV (UNESCO) thanked IUPAC for their significant contribution to the success of the meeting. (iv) Dr. COOK, Convenor of the Working Group for the project *Continuing Education in Industry*, reported that he had given a paper on the project at the International Symposium on Chemical Education, Ljubljana, and will be sending the report to Dr. J. W. BARRETT, Chairman of the International Company Associates Group. (v) Prof. LAFFITTE reported that the Anthology of Chemical Education articles was almost complete, and that the final manuscript would be sent to Dr. DONTSOV (UNESCO). (vi) The Chairman reported that the *Survey of Chemistry in Developing Countries* had been completed. A resumé would be given in the *International Newsletter*.

3. *International Symposium on Chemical Education, Ljubljana, 25–30 August 1977.* Over 350 participants from 45 countries attended the Symposium. Arrangements for publication of the proceedings were being made by Prof. KORNHAUSER.

4. *International Newsletter on Chemical Education.* The Chairman reported that Issues Nos. 5 and 6 had been published. A contract with UNESCO was being prepared for further issues. Concern was expressed that the *Newsletter* was not well enough known and the Secretary was instructed to write to National Representatives to ask them to whom they distributed the *Newsletter* and the reasons for their choice.

5. *Future Activities of the Committee.* It was decided that priority should be given to: (i) A book on

Chemical Education, 1973–78, with contributions from National Representatives (or their nominees) outlining the new school and university programmes and educational research during the six-year period. (ii) To help communications of ideas on the production of low-cost equipment and low-cost and simple experiments at school level. (iii) To organize a small symposium to be held in August 1979 in Dublin, Ireland, to be concerned with the school chemistry curricula in general and the interface between school and university in particular. (iv) Consideration for the establishment of an international centre for chemical curricula in general and the interface between school and university in particular. (iv) Consideration for the establishment of an international centre for chemical education. (v) Continuing Education in Industry: prepare proposals in conjunction with Dr. BARRETT (Chairman of the International Company Associate Group) in order to continue this programme. (vi) A text-book for teachers on the methodology of chemical education. (vii) Following the proposal by the Secretary General of IUPAC (Prof. G. OURISSON) concerning the production of monographs on *Chemistry for People*, to ask National Representatives to send information on such publications in their countries by individuals, professional societies, industries, academies.

6. *Chemical Nomenclature*. The Secretary reported that the Committee has been asked to consider improvements to the Association of Science Education's (UK) report *Chemical Nomenclature, Symbols and Terminology*.

7. *UNESCO Advisory Panel on University Chemistry Teaching*. The Chairman and Secretary attended a meeting of the Panel in Paris, France, in January 1977, where it was explained that UNESCO hoped to strengthen and further the fruitful relationship with the Committee.

8. *Atomic Weights of the Elements, 1975*. The Committee received the paper *Atomic Weights of the Elements, 1975*, from the Inorganic Chemistry Division, Committee on Atomic Weights.

9. *IX International Chemical Olympiad, Bratislava, 1977*. This was supported by UNESCO, and organized according to the Statutes [*International Newsletter on Chemical Education* Nos. 3, 4 (1975)] and attracted 47 students from 12 countries. The Xth meeting will be held in Poland in 1978.

10. *ICSU Committee on the Teaching of Science (ICSU CTS)*. The book on strategies of learning and teaching, particularly at university level, was to be published shortly. A conference *Integrated Science Education World-Wide* is to be held in Nijmegen in 1978. Concern was expressed about the lack of chemistry in several integrated science courses. Prof. RAO, with Dr. WADDINGTON as alternate, was recommended as the Committee's representative.

11. *IUPAC Budgets for 1978 and 1979–80*. The Committee was concerned that only US-\$250 had been allocated for administrative expenses for the Committee this year, particularly as it was no longer

possible for much of the secretarial and administrative work to be done in Oxford. The Committee agreed that it was important that the Chairman's and Secretary's institutions were not unfairly burdened and that a major proportion of the administration element of the contracts gained by the Committee was allocated to the Officers. The Officers were instructed to prepare a budget to ensure that future activities could be pursued. Dr. DONTSOV (UNESCO) reminded the Committee that UNESCO, before funding projects, expected an organization to provide at least a nominal amount as a gesture of goodwill and confidence.

12. *Next Meeting of the Committee*. The Committee meeting will be held in Cassis, near Marseilles, on 20–21 or 27–28 May 1978. One of the principal items for discussion would be the planning of the next Symposium.

Present: Prof. C. N. R. RAO (Chairman), Dr. D. J. WADDINGTON (Secretary), Prof. G. S. HAMMOND, Prof. G. ILLUMINATI, Prof. M. LAFFITTE, Dr. T. M. SUGDEN, Prof. D. VITOROVIC (Members). Prof. H. BREMER (GDR), Dr. W. A. COOK (USA), Prof. I. DILARIS (Greece), Prof. L. de BROUCKERE (Belgium), Prof. A. H. GUERRERO (Argentina), Prof. R. GUILLAUMONT (France), Mr. T. HITCHINGS (New Zealand), Dr. U. HOFACKER (FRG), Prof. A. KORNHAUSER (Yugoslavia), Prof. B. T. NEWBOLD (Canada), Dr. M. D. ROBINSON (UK), Prof. D. SAMUEL (Israel), Prof. T. SCHONFELD (Austria), Mr. P. A. START (Ireland) (National Representatives). Mr. D. G. CHISMAN (UK), Dr. S. JAGNER (Sweden), Prof. I. PAIS (Hungary), Dr. K. V. SANE (India), Prof. H. WYLER (Switzerland) (Observers). Dr. G. DONTSOV (UNESCO) attended the meeting when items 2, 3 and 5 were discussed, and Prof. M. J. FRAZER for items 4 and 10.

IUB-IUPAB-IUPAC COMMISSION ON BIOTHERMODYNAMICS (CB)

Meeting at Lund (Sweden): 20–21 August 1977

1. *Report on Some Commission Matters*

Standing Orders. Following a request from IUPAC the Commission prepared at its meeting in Charlottesville (1976) suggestions for Standing Orders of the Commission. These have since been approved by IUPAC, IUB and IUPAB.

Attachment to IUPAC Division. IUPAC has decided that the Commission shall be attached to the Physical Chemistry Division of IUPAC.

Liaison with other international bodies. The Commission has been granted the status of 'Associate member of CODATA'. Contacts have been established with the Bioenergetics Group of IUB and IUPAB. Informal contacts have been established with the IUPAC Section on Clinical Chemistry.

Recommendations for equilibrium measurements. The 'Recommendations for measurement and presentation

of biochemical equilibrium data' has now been published in several journals including as Provisional Nomenclature Appendix No. 61 (July 1977) to *Inf. Bull.* The Recommendations have been translated into Russian and into Japanese. These versions are expected to be published during 1977–78.

2. *Monograph on Biothermodynamics.* It was decided that the publication of the textbook should proceed as a private venture. The sponsorship of the Unions through the encouragement and planning by the Commission will be acknowledged in an introductory statement.

3. *IUPAC Commission I.2 (Thermodynamics and Thermochemistry).* ARMSTRONG, WESTRUM and WADSÖ reported on the recent meeting of IUPAC Commission I.2 (IUPAC General Assembly meeting in Warsaw, August 13–17, 1977).

4. *Reports and Discussions Related to Task Group Activities*

Task Group on Compilation of Thermodynamic Data of Biological Interest (Chairman: G. T. ARMSTRONG). The project proposal submitted to CODATA will be revised. Further contacts will be taken with representatives for the 'Solubility Data Project' and the 'International Data Series B'. Several individuals, not formally attached to the Commission, will be invited to participate in the work of the task group.

Task Group on 'Recommendations for measurements and presentation of biothermodynamic data' (Chairman: P. PRIVALOV in close cooperation with R. L. BILTONEN). The name of the task group has been changed, it referred earlier only to heat capacity studies. Drafts entitled 'Recommendations for measurements and presentation of thermodynamic data. II. Heat capacity' have been prepared by PRIVALOV and BILTONEN. It was felt that the Recommendations should not be limited to heat capacity functions but should also incorporate enthalpy, entropy, volume, compressibility, etc. Another draft will be prepared by BILTONEN.

Task Group for calorimetric measurements on cellular systems (Chairman: I. WADSÖ). A first draft of 'Calorimetric Measurements on Cellular Systems. Recommendations for measurements and presentation of results' has been prepared by WADSÖ. The draft was discussed at the meeting and several suggestions for changes were made. Another draft will be prepared.

Task Group on meetings (Chairman: H. GUTFREUND). (This task group was earlier named 'Subcommittee on meetings'). WHELAN stressed the importance of close contacts between this task group and other groups such as the IUB Committee on Symposia. It was agreed that GUTFREUND would establish

contact with the IUB group. It was reported that the Commission (unofficially) had initiated and taken part in the organization of two workshops related to biothermodynamics during the Fifth International Conference on Chemical Thermodynamics in Ronneby, Sweden, 23–26 August 1977: 'Hydrophobic interactions – the current situation' (organizer F. FRANKS, UK) and 'The conformational thermodynamics of biological macromolecules' organized by BILTONEN and PRIVALOV. H. SUGA and T. FUJITA informed the Commission that a 'satellite meeting' on biothermodynamics (or biocalorimetry) will most probably be arranged during the IUPAB Congress in Kyoto, September 1978. It was agreed that the Commission will not officially be involved in the arrangement of this meeting and it was anticipated that individual members of the Commission would give assistance to the organizers. GUTFREUND informed that the task group has initiated plans for the arrangement of a FEBS supported advanced study course on 'Calorimetric methods for the study of phase transitions and other cooperative processes'.

5. *Classification of calorimetric instruments and assessment of their properties.* It was agreed that there is a need for authoritative guidelines for the classification of different types of calorimeters and in the assessment of their characteristic properties. WADSÖ shall further review the situation and report at the next Commission meeting.

6. *Reference materials.* The Commission has decided to study the need for a convenient and reliable supply of some test (or standard) substances, in particular for calorimetry. ARMSTRONG and BILTONEN agreed to present a forthcoming report at the next Commission meeting.

7. *Membership and other Commission matters.* J. T. EDSALL announced that he would like to resign from the Commission. H. EISENBERG, Rehovot, was appointed as his successor. J. P. BELAICH, Marseille, has been appointed as an Associate member. The Commission appointed R. L. BILTONEN as its Vice-Chairman.

The next Commission meeting will take place in the eastern part of the US in December 1978.

Present: Members: G. T. ARMSTRONG and I. WADSÖ (Chairman) (representing IUPAC); H. GUTFREUND and P. PRIVALOV (representing IUB); R. L. BILTONEN and J. T. EDSALL (representing IUPAB). Associate Member: D. F. WILSON. Union liaison representative: W. J. WHELAN, General Secretary of IUB (20 August only). Observers: E. F. WESTRUM, Jr. (Secretary General of CODATA); H. SUGA (Osaka); T. FUJITA (Tokyo); S. J. GILL (Boulder, 20 August only).

CHEMICAL EDUCATION IN THE COMING DECADES: PROBLEMS AND PROSPECTS

An International Symposium on Chemical Education (25–30 August 1977) and a European Seminar on Chemical Education (30–31 August 1977) were held at the University of Ljubljana under the sponsorship of UNESCO, IUPAC, Federation of European Chemical Societies and Union of Yugoslav Chemical Societies with 337 participants from the following countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Cuba, Cyprus, Czechoslovakia, Denmark, Federal Republic of Germany, Finland, France, German Democratic Republic, Ghana, Greece, Upper Volta, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Malaysia, Netherlands, New Zealand, Nigeria, Poland, South Africa, Spain, Sweden, Switzerland, Turkey, UK, USA, USSR, Venezuela, Yugoslavia. Besides, over 50 secondary school teachers and university lecturers partly participated in the work of the Symposium and/or Seminar. The Organizing Committee and the local organizing group, altogether 42 members, made every effort to ensure fruitful work and an enjoyable stay for the participants.

The introductory information was given and welcome wishes were expressed by Prof. A. KORNHAUSER, who presented a short report on preparatory work and informed the audience about the geographical and professional structure of the participants. The latter was as follows: professors (73), assistant professors/docents (33), assistants (18), heads of departments or directors (23), specialists for CHEMED (35), educational officers (5), lecturers (34), engineers (14), chemistry teachers (74), chemistry students (11), others (17).

The Vice-President of Yugoslav Government's Federal Executive Council, Prof. A. VRATUSA, gave the introductory address to welcome all the participants. He pointed out the growing importance of science, especially of chemistry, in the attempts to solve crucial problems of mankind, and the corresponding tasks of chemical education, giving some examples of efforts in the host country. Finally, he thanked the participants and chemical organizations for their efforts and wished them further success.

The welcome address on behalf of IUPAC was given by Prof. C. N. R. RAO, Chairman of IUPAC Committee on Teaching of Chemistry and the President of the Organizing Committee. Greetings and welcome wishes on behalf of the Federation of European Chemical Societies (FECS) were presented by Prof. J. BÉNARD, Chairman of the Working Group on Chemical Education of FECS.

UNESCO's address was presented by Dr. G. DONTSOV, who was one of the main organizers of these meetings. Because of the tragic accident in which

Dr. DONTSOV lost his life, this was the last international project of the excellent organizer and colleague. His death is a great loss for all who were fortunate in knowing him and cooperating with him. Outstanding success of the Symposium and Seminar will be one of the numerous achievements in which his work will be remembered.

INTERNATIONAL SYMPOSIUM ON CHEMICAL EDUCATION

The work of the International Symposium on Chemical Education included plenary lectures, given by invited speakers, followed by group discussions, in which participants considered selected questions defined by the invited plenary discussion leaders after the plenary lecture. The results of group discussions were presented by group discussion leaders in the final plenary discussion session, where also conclusions and recommendations were coordinated. In this way, 86 participants were involved in the work as plenary lecturers, plenary discussion leaders or group discussion leaders. All of nearly four hundred participants were able to take an active part in discussions, which were held parallelly in 12 discussion rooms. Each time participants were able to choose among topics they wished to discuss. The objectives of the Symposium and Seminar were to define the major current problems and to consider the future of chemical education in the context of: (i) the changing needs and demands of society; (ii) the developing nature and scope of chemical sciences; (iii) students' aspirations and attitudes; (iv) the demands in the developing countries; and to prepare recommendations for the future of chemical education at secondary and other levels.

In his opening plenary lecture, C. N. R. RAO presented 'Man's pressing problems and the role of chemists' and outlined problems of energy, hunger and poverty, environment and health, population growth and future development of society and science. He also discussed the changing scope of chemical science, information explosion and problems of popularization of science. He defined the role of chemists and chemical educators in connection with the development of chemical science and the needs of developed and developing countries. The need for international cooperation and global action was stressed and the responsibility of scientist-educator pointed out. Also in chemical education, global strategies in addition to regional and national strategies are needed. Not only UNESCO but all international organizations

are responsible to be active in the efforts to bridge the present gaps as the only way for a more just development and peace in the world. In the plenary discussion chaired by D. SUNKO, the problems of chemical education in developing countries were especially stressed and the need for a symbiosis also in this field of human creativity considered as an important condition for a more balanced development.

'Chemistry and Society' was the topic of J. BÉNARD's lecture, which followed. He critically presented the achieved efforts for the adaptation of chemical education to the evolution of science, technology and society. Among factors affecting relatively low results in this process, he mentioned rigidity of chemical programmes and methods of chemical education, and the gap between chemists and public opinion. He, too, presented the main man's problems and the role of chemistry in the search of their solutions. The chemistry teacher has to face the growing interdisciplinary character of natural sciences and the application of their results in production and everyday life. Besides, he has to be enthusiastic in his profession since personality remains an eminent factor in education. In the plenary discussion, which followed under the chairmanship of G. DONTSOV, especially the need was pointed out to support developing countries in their efforts in chemical education through an exchange of programmes and educators.

The plenary lecture of G. S. HAMMOND was devoted to the problems of 'Teaching Chemistry for Tomorrow's Citizens'. He pointed out that the content of chemistry courses was too much under the influence of the historical precedent and burdened by heavy emphasis on students' preparation for subsequent courses. He also discussed the main questions in designing chemistry curricula: What are the basic concepts that chemists use? What are some of the properties of materials commonly encountered in life that can be understood and/or controlled by applied chemistry? How to deal with complex substances encountered in life? Where is science going at this time? What is the real value of quantitative measurements? How does chemistry interact with other pure and applied sciences? He presented especially problems of chemical education in the explanation of atomic and molecular hypotheses, of quantum mechanics as a modeling method, problems in the introduction of thermodynamic thinking with assessment of the quality of extrapolations. Special attention was paid to the problems in the teaching of properties of materials and catalysis as examples of education for the needs of future citizens. Experimental work was also critically considered, and finally, the role of other natural sciences and mathematics for chemists was discussed.

After group discussions, also followed by a plenary discussion, the plenary discussion leader T. M. SUGDEN presented the statements, recommending an early introduction of environmental chemistry at late primary stages, integrated approach of chemistry in connection with other natural sciences in dealing with chemical aspects, introduction of socio-economic factors for the consideration of energy options, and especially stressing positive applications of chemistry. Ideas about 'basic concepts' varied but there was a general agreement that they should be introduced against a solid basis of facts and not to be forced beyond the level of students. Finally, it was recognized

that the pattern of education in chemistry widely varies from country to country and that there is no unique solution to implementation.

'Students' Attitudes to Chemistry' were presented in the plenary lecture of M. J. FRAZER. After having given a summary of research areas on attitudes, he discussed attitude measurements and their results at school level and at university level, concerning interest, enjoyment, subject preference, social and economic attitudes, curiosity, objectivity in observation, as well as attitudes related to social background, sex, school organization, teacher, age, achievement, subject choice, subject difficulty and career preference. In his recommendations he proposed the following: (i) chemists should support programmes for an improvement of science teaching in primary school since attitudes to science are largely formed before the age of 12–14; (ii) chemistry teachers at school and university level have to play an important role in the development of attitudes—more attention should, therefore, be given to the establishment of appropriate teaching methods and to methods for attitude measurement; (iii) further studies are needed in order to understand the reasons for declining enrolments into chemistry courses at university level in many developed countries; (iv) some international body (UNESCO, ICSU, ICASE) should establish a register of attitudes to science scales.

The plenary discussion leader U. HOFACKER presented, after group discussions and the final plenary discussion, statements in proposals for the development of desired attitudes, especially the concern for the application of chemistry for the benefit of community, the development of critical mind, attitudes to teamwork. Methods to achieve the development of these attitudes with assessment and evaluation were proposed suggesting that more attention should be paid to 'consumer chemistry'; to socio-economic relevance of chemical industry and to the introduction of real problems as well as to cooperation with industry in chemical education. Finally, when discussing students enrolment, chemistry study was recommended not only for a profession but also for general education.

In his plenary lecture, G. C. PIMENTEL discussed 'Criteria for Selecting Content for Chemistry Curricula'. He presented goals for a general introductory chemistry class both at secondary and college levels, discussing flexibility vs. specialization and short range and long range points of view. He pointed out that both descriptive chemistry and unifying concepts should be presented in every introductory course in chemistry as well as investigative method should be used. After having given a proposed outline for an introductory chemistry course, he discussed, using an example of thermodynamics, the presentation of unifying concepts of chemistry by the investigative method. He stressed that unifying principles, which give coherence to our knowledge, and the use of these principles to develop expectations are the essentials of the scientific method. Our task is to find ways to give student access to these unifying principles within his developing vocabulary, within his level of comprehension and by drawing on his own experience and interests, to enable him to understand and accept the interplay between observations we make and the unifying concepts we devise, because this is science.

In group discussions, followed by the plenary discussion chaired by M. TISLER, especially flexibility vs. specialization in curricula, relative values of long range vs. short range focus on teaching and relative emphasis on unifying concepts of chemistry vs. descriptive chemistry were discussed. A careful balance between conceptual and descriptive material at all levels of chemistry teaching was recommended with an increasing importance of theory at higher levels of chemistry teaching. Chemistry should be considered as an important part of general education. Specialization should include basic concepts as well as applications, connected primarily with life science and engineering. Finally, the main goals of secondary school science for the education of future citizens were considered in the context of flexibility vs. specialization and short term and long term projection.

'Report on Quantum Chemistry Teaching' by D. HADZI was illustrated with examples of the rapid development as well as current and future trends in quantum chemistry research. The present status of quantum chemistry and particularly future trends pose increasing demands on teaching. Whereas till now the interpretive capacity of quantum chemistry was exploited in teaching, future chemists will also have to use its predictive capacity. Therefore, the desirable level of knowledge and skills, early or late inclusion of courses in quantum chemistry into curriculum as well as methodological aspects of teaching were discussed, presenting the advantages and difficulties of an early and a late course in quantum chemistry along with problems of quantum chemistry teaching methods. Finally, the need for a special study project was expressed to prepare recommendations for quantum chemistry teaching.

Group discussions and the plenary discussion chaired by B. T. NEWBOLD concluded that quantum concepts should be included in chemistry courses at secondary school level and at the first year university level. However, better mathematical background knowledge is needed for it. It was recommended that less time should be devoted to the Schrödinger equation in quantum chemistry classes. Precise definition of quantum chemistry concepts for teaching at the mentioned levels and adequate training of teachers is the pre-condition for success, therefore the proposal for a special study was supported.

W. B. COOK presented the results of the 'International Survey of Continuing Education of Chemistry in Industry'. On the basis of an analysis of approx. 250 contacts in 43 countries, he discussed the results concerning the present continuing education of chemists in industry, gave examples of its methods and programmes and of an interchange between university and industrial staff. He proposed recommendations for industrial organizations, especially for analyzing the type of graduate and courses, for initiating industrial research projects in cooperation with university and cooperation with chemical professional societies in developing programmes of continuing education for the needs of industry. Recommendations for educational institutions include co-op or sandwich courses, cooperation of industrial chemists in education and university teachers in industrial research.

The introduction of the plenary discussion leader D. VITOROVIĆ presented key questions for group discussions, considering the general profile of chemists

for the employment in industry, transition from academic life to industry, forms of continuing education of chemists after employment and general aspects of the significance of continuing education of chemists in industry. In group discussions, followed by the final plenary discussion chaired by D. VITOROVIĆ, participants prepared recommendations to industrial organizations concerning forms, content and methods of cooperation of industry, university and partly also secondary schools, further, recommendations to educational institutions for the development of corresponding programmes for a number of courses, as well as recommendations to IUPAC, governments and professional bodies for the support of these processes. Finally, a classification of course-types was proposed, arranging these into discipline-oriented courses and problem-oriented courses.

M. HLADNIK presented a 'Survey on Chemical Education in Industry' giving an example from pharmaceutical-chemical works. He explained the ways of manpower planning on the basis of operational phases and illustrated it with an example of development of an industry starting under very modest conditions but achieving outstanding results, mainly because of very intensive care for personnel training. Further on, examples of cooperation of chemical industry with schools and universities in teaching and in research were presented as well as many other forms of well-organized in-service training of all members involved in production.

K. V. SANĚ informed the participants on 'Some Highlights of the Report on the Survey of Chemical Education in Developing Countries'. The survey was recently conducted by C. N. R. RAO with the support of IUPAC. It is based on a Questionnaire collecting quantitative, statistically-oriented information about chemists of all types in the countries, and qualitative, problem and project-oriented information, concerning schools, universities, chemical research and chemical industry. The answers from 17 countries made a comparison of scientific manpower and chemical education in these countries possible. Areas of international cooperation in chemical education are suggested, such as exchange of information and expertise, curriculum and teaching aids development, international workshops, exchange of chemical educators.

In group discussions and plenary discussion, which followed, chaired by D. G. CHISMAN and A. GUERRERO, the problems which were defined as crucial were: shortage of qualified trained teachers, lack of retraining courses for them, too large classes, poor facilities, out-of-date textbooks, rigid syllabuses and examinations, lack of motivation for teachers and students. Recommendations for classification of needs and aspirations of developing countries and the corresponding organization of chemical education, and recommendations for the help from international organizations, especially IUPAC and UNESCO, were accepted. The latter stress the need for production and dissemination of sourcebooks and organization of summer schools in an international centre for chemical education, based on an existing successful centre, to which teachers and curriculum designers can be invited from developing countries for their participating in short courses, seminars and interaction with colleagues. The centre for chemical education in Ljubljana could

be one such centre suitable for this purpose having the advantage of good access from Asia, Africa, Middle East and the rest of Europe.

'Teaching Chemistry at Low Cost' was the next topic of the Symposium, presented by E. APEA in his plenary lecture. He stressed that effective teaching of chemistry depends on three factors, i.e. teachers, equipment and chemicals. In listing difficulties when equipping school science laboratories he explained problems concerning the import of equipment in developing countries, high cost and irregular supply of chemicals, lack of laboratories, shortage of laboratory technicians and poor experimental experience of teachers with little in-service training for these needs. To overcome the foreign exchange problem in the importation of science equipment, UNESCO Coupons Programme was settled which provides a useful assistance to member countries. Improvised equipment is often cheap but it cannot meet the massive demands for equipment for chemistry teaching in developing countries. Local production is often the answer, however, economic factors have to be taken into account. The author discussed these in depth. Finally, he called for more careful purchasing and maintenance of equipment.

The plenary discussion leader D. J. WADDINGTON presented questions to be considered in group discussions with regard to the role of teachers in equipment production and use and in purchasing chemicals. Communication of ideas at international level was especially pointed out. After group discussions, a summary of these was given at the plenary session along with suggestions for training and encouraging teachers to improvise and use equipment locally produced. Teachers and schools should also cooperate in the local production of chemicals as well as favour small-scale techniques. More experimental work in teacher training was recommended as well as the design of experiments with very simple equipment, and better exchange of information including source-books and international workshops was suggested.

H. BUCHOWSKI and A. GORSKI presented 'Some Aspects of Evaluation of Chemical Education' and considered balance between facts and theory, calling for great caution in limiting the descriptive chemistry. They discussed aspects of division of chemistry lecturing material into particular disciplines proposing that the traditional division should be replaced by three main sections: chemical structures, structural changes and reactions, and methods of synthesis. University study should be organized in three didactic cycles: introductory, refining and research cycle. Critical consideration of laboratory work shows few new approaches towards the introduction of research methods and problem solving approach. The same is true for the introduction of the actual and dynamic image of chemistry into secondary and tertiary curricula. More cooperation between secondary schools and university is needed, not only at national but also at international level.

The plenary discussion leader D. SAMUEL defined in his plenary introduction first of all what evaluation is and what can be evaluated in chemical education, and enumerated courses and curricula, laboratory work, books and journals, teaching aids but also teaching methods, teacher's work, students or students' groups, attitudes and achievements etc.

Further on, he defined who needs to know the results of this evaluation, listing individuals such as teachers, authors, inventors of new teaching methods as well as organizations and commercial enterprises. Finally, he discussed who should perform the evaluation, stating that there seems to be little enthusiasm for it, which is – in his opinion – due to a mixture of conservatism, prejudice and reluctance to air problems in public. He recommended that evaluation should become an essential component of all education, and that ideas, methods and results should be exchanged at international level.

An introduction to group discussions on evaluation in chemical education was also given by M. GARDNER. She stressed that, in order to evaluate successfully, we must first assess our needs and state our objectives, then we can evaluate against the identified needs and stated objectives. In addition, we have to evaluate for unanticipated, positive and negative results. Finally, she discussed some evaluation systems and the ways of using evaluation data. She, too, pointed out that evaluation was an essential process in chemical education, which must be thoughtfully designed and used at every level and in every facet of chemical education.

In the summary of group discussions on aspects of evaluation of chemical education, presented at the plenary discussion session chaired by D. SAMUEL, an evaluation of secondary school curricula, chemistry teaching at university and an evaluation of chemistry books, teaching films and other teaching aids were presented as the basis for recommendations. IUPAC and UNESCO were asked to set up working groups to establish guidelines for the evaluation of courses, curricula and teaching aids and to prepare a survey of existing evaluation systems. A committee should be set up for an international cooperation in the transfer of methods and results of evaluation. Recommendations for encouragement of evaluation in chemical education were also addressed to chemical societies, university departments of chemistry and editors of chemical education journals.

In her plenary lecture 'Trends in Research in Chemical Education' A. KORNHAUSER enumerated first the needs for intensive research in this field because of the exponential growth of scientific information, increasing abstraction of concepts, complex and rapidly changing technology, democratization of society and the need to bridge big educational gaps in short time in many countries. General research for chemical education is mainly in experimental psychology. In the last two decades, chemists were more engaged in specific, school-related developmental work, especially in curriculum development. Content oriented research studies present critical analyses of curricula, introduce new fields of chemistry and new research methods into education. The search for better methods in chemical education gives priority to guided discovery or investigative approach, problem solving, methods of explanation of abstract concepts of chemistry at lower levels, programmed learning and laboratory team-work. Research of teaching aids and the use of educational technology brings results especially in model construction and use, in all kinds of film techniques and other audio-visual aids; the interest for CAL does not increase to the same extent as it did some years ago. Assessment and evaluation

research includes mainly test-based studies, evaluation of curricula, text-books and apparatus. Assessment and evaluation of teacher's work is rare. In conclusion, methodology of chemical education was considered as an important chemical discipline, interdisciplinary linked with psychology, theory of learning and sociology.

In his introductory explanation, the plenary discussion leader A. H. JOHNSTONE proposed main questions for discussion, concerning the needs for this research, usefulness of results, research methodology, evaluation of research findings and gaps in present research in chemical education. After group discussions, results were presented and critically considered also at the plenary discussion. It was agreed that more attention has to be paid to the transfer of research results, also by an exchange of teachers and students. The dissemination of results via pilot studies and workshops was recommended. Chemical research methods should be adapted to chemical education research. A short document on the basic tenets of the work of developmental and experimental psychologists should be prepared for chemistry teachers. During in-service training, teachers should receive some research experience. Future research should include more problems concerning the establishment of the irreducible core of chemistry at all levels, problems of interdisciplinary cooperation, relevance of chemistry study for future citizens and studies for effectiveness of all parts of chemical education process. Recommendations, based on these statements, were addressed to authorities, researchers, UNESCO, IUPAC, and FECS.

The International Symposium on Chemical Education was concluded by C. N. R. RAO, President of the Organizing Committee, who summarized conclusions and recommendations, thanked all who made the Symposium a success and presented compliments to the host country and university. Finally, Dr. G. DONTSOV stressed the future goals and obligations of international organizations, especially of UNESCO and IUPAC.

EUROPEAN SEMINAR ON CHEMICAL EDUCATION

Most of the participants of the International Symposium on Chemical Education also joined the programme of the European Seminar on Chemical Education, which was opened by Prof. J. BÉNARD and Dr. G. DONTSOV. In the opening session, specific problems of European chemical education were stressed by Prof. M. J. FRAZER. The programme consisted of two main activities: three plenary lectures followed by plenary discussions; and the poster-session programme – consisting of an exhibition of posters with individual explanations, and of special 30-minute poster sessions, held twice by each author so that the participants were able to attend all the desired sessions.

M. LAFFITTE gave a critical commentary on the recently published 'Survey of Chemical Education in Europe' and expressed sincere acknowledgements to the authors and editors. He systematically presented the content of the Survey, calling for participants'

attention first on the description of educational systems in general and then giving a more detailed explanation of secondary and tertiary level of chemical education. As to the latter, he pointed out similarities and differences between European countries. He also discussed problem-oriented articles of the first part of the Survey. Here he especially stressed that the chemistry student in Europe was still mainly exposed to traditional methods of teaching. There is hardly any cooperation of chemistry teachers with industry and other forms of everyday life. Research, even if declared as the basis of modern chemistry teaching, is still more an exception than a rule for most chemistry students and especially for chemistry teachers. The same is true for their in-service training. When discussing the financial problems, M. LAFFITTE pointed out that decision makers were not convinced about the indispensable role of chemistry in education for the twentieth century, and called for a more socio-economic engagement of chemists.

The plenary discussion leader G. ILLUMINATI gave first an introduction to group discussions, that were then followed by the plenary discussion, in which statements and recommendations were summarized. It was stated that the Survey was very valuable but it should be considered as the first step, as some sort of a catalyst for more intensive cooperation in chemical education in Europe. The next step should be a more detailed evaluation of key problems in chemical education with proposals for their solution. After the discussion of regional strategies and actions in Europe, the need for the above mentioned additional analysis of key problems was defined more in detail and recommendations for its support in national chemical societies were accepted.

J. A. DOUEK presented the topic 'Chemistry as a supporting subject', giving as example the training of technical educators in Europe. She considered broad aims of chemistry courses as a supporting subject, their applicability to these types of courses, and the content of selected chemistry courses attended by engineering students in a number of European countries. First she defined what an engineer is. Then she divided them into three groups: conception engineers, liaison engineers or senior technicians and execution technicians. By a comparison of these qualifications in many countries she gave not only several semantic but also system answers. Conception engineers' study was presented in more detail, giving information about level and content of the curriculum as well as an international comparison of the time spent for chemistry study, ranging from 2 to 8%. Finally J. A. DOUEK discussed in detail a wide list of aims of chemistry courses for engineers, the relationship between chemistry and physics, and the methods, which only partly move toward problem solving. In future, more attention has to be paid not only to new materials, but also to an understanding of the role of chemistry in progress. Environmental aspects and energy topics have to be included. More communication among chemists, chemistry teachers in engineering and industrialists could help a lot in the improvement of this part of chemical education.

There were two discussion leaders: D. KOLAR, Professor of Chemical Technology, and Dr. M. TOMŠIČ, University teacher in Engineering. Therefore, the discussion was also influenced from both

viewpoints and joined with the following statements: non-chemical disciplines in many cases do not realize or they underestimate the role of chemistry as a supporting subject, cutting down the scope of chemical education of their students to a minimum or even deleting chemistry from curricula; chemists, however, very often ignore the specific needs of non-chemical disciplines, and give the students traditionally structured programmes of chemical systematics with little or no relevance to their future profession. It was concluded that appropriate programmes for chemistry as a supporting subject can be developed only in close cooperation of chemists with teachers of main subjects and specialists from industry. Team-teaching of those parts of the programme where the overlapping of disciplines is sufficient was recommended.

The topic 'Out-of-school Activities for Young People—Competitions in Chemistry' was, because of the illness of the announced speaker J. ZÝKA, presented by A. SIROTA and J. MĀČHACKOVĀ. The need for these activities was pointed out because uniform curricula do not make adequate development of talented students possible. As main positive achievements were enumerated: activity of students, broadening of fundamental knowledge, motivation of talents for creative work, the development of logical abilities, positive influence on present chemical education. The authors described content and methods of chemical hobby groups, chemical clubs, scientific, technical and purely chemical students' societies, and discussed in detail some forms of activity, such as special lectures on specific topics, games, film and television programmes, meetings, students' conferences, summer holiday activities. Finally, the organization and experiences of chemical olympiads were presented. In conclusion, the lack of suitable literature for secondary school students, lack of interesting and suitable 'real-life' topics, difficulties to get teachers interested in out-of-school activities and lack of assistance for their work, were enumerated as problems which should be further discussed.

The plenary discussion, chaired by P. A. START, stressed that universities and academies of science have to be much more involved in out-of-school activities in chemistry than at present and that it is necessary to put the same request to industry. Only in this way it will be possible to orientate talented students, through these activities, to chemical professions. These institutions and industry should open their doors to students and their secondary school tutors, helping them to find adequate real problems and also to accomplish the experimental work. To encourage secondary school teachers for tutorial work in students' projects, the in-service-training of teachers should include a part of research work, bringing them into professional research groups. Top scientists should give an example in the efforts for popularization of science by writing popular presentations of science achievements and methods and by bringing science to the youth. Research associations and governmental organizations should give awards to such scientists as well as to tutors and students.

Poster Session Programme

The poster session programme included the following posters with their presentations to groups and

individuals: M. E. ALONSO, The functionality number—A new approach to an advanced organic chemistry course; C. F. BELL, Sandwich courses in the United Kingdom—the present situation and future development; V. D. BIANCO, F. CUSCITO, M. LAZZARINI, G. PEDOTA, The teaching of chemistry in elementary school—Some proposals; M. CHASTRETTE, H. LATREILLE, Evaluation of the chemistry level of students entering university; J. J. CHRISTIANSEN, Home-made, lowcost apparatus for the elementary chemistry education: a thermometer, a photometer and a pH-meter; R. CLARK, Some innovations in Australian chemical education; T. CVITAŠ, The backbone of physical chemistry; T. CVITAŠ, N. KALLAY, IUPAC (STU Commission's) recommendations in teaching of chemistry; A. CALCQ, Self-service audio visual revision for a general chemistry course; L. DUMONTEL, G. JEANNIN, Individual Practical Work—Sun Energy: Evaluation of two students; M. ESFANDIARI, Has the new system of education in Iran succeeded in training scientifically minded students; S. V. ESWARAN, A call for a chemical course with greater student involvement; M. J. FRAZER, FECS Exhibition; M. J. FRAZER, R. McCABE, Student difficulties with chemical problem solving; A. GORSKI, Chemical systems; A. GUERRERO, Teaching the scientific method—Research miniprojects; J. HURWIC, Sur certaines inexactitudes dans des ouvrages universitaires pour l'enseignement de la chimie; E. E. JONES, D. J. SILVERT, J. S. WASSON, The resource centre—A spark of light for undergraduate teaching; J. JOSEPHSEN, Research-like and routine experimental work in project-oriented studies of first-year students at Roskilde University; G. JOVANOVIĆ, S. KRKLJUŠ, R. HALAŠI, Feedback information and device in chemistry teaching and learning; H. M. KUSS, Theory of information and chemical education; G. LATZEL, Presentation of the film 'Chemical equilibrium'; R. LISSILOUR, Localised or delocalised LCAOMO—Some pedagogical problems; A. LITAN, Teaching chemistry to mechanical and electrical engineering students; P. MANZELLI, Chemical education in developing countries on the basis of teaching experience in Somalia; P. MELZER, Science teaching in teacher training schools; Z. NIRAZ, Test research of the students' first chemistry course; P. A. ONGLEY, Students assessment of teachers courses; M. B. ORMEROD, Valuating the suitability of 'real' models for teaching chemical structure and properties; C. PALMER, D. NEERINCK, Attitudes towards subject matter and choice of study subject in students of chemistry; P. J. SLOOTMAEKERS, A Kellerplan course in chemistry and the need of its modification; C. PICO-MARIN, M. L. VEIGA BLANCO, Educational evaluation in fundamental chemistry; J. VAER-NEWIJCK, Exhibition; V. VAJGAND, Exhibition; D. WILMET, Utilisation de l'audio visuel pour de l'enseignement la chimie au niveau universitaire; U. ZOLLER, 'Smoking and cigarette smoke'—An innovative, interdisciplinary, chemically-oriented curriculum.

At the conclusion of the European Seminar on Chemical Education, for which participants agreed that it was a success because of the programme and because it brought together chemical educators giving them opportunity also for many informal group discussions,

the new Chairman of the Working Group for Chemical Education of the Federation of European Chemical Societies, Prof. M. J. FRAZER, University of East Anglia, Norwich, UK, was elected. Participants agreed with applause to the proposal for the nomination of the hitherto Chairman Prof. J. BÉNARD, University Pierre and Marie Curie, Paris, to a permanent member of the Working Party. U. HOFACKER, German Chemical Society, Frankfurt, was re-elected as a Secretary.

Final conclusion of the whole event was given by Dr. G. DONTSOV with a survey of achievements, and even more of tasks for the future, especially for the coming period of two years, which will be followed by the next joint International Symposium and European Seminar in Dublin, Ireland, in 1979.

A. KORNHAUSER

REPORTS OF IUPAC-SPONSORED SYMPOSIA

INTERNATIONAL SYMPOSIUM ON MICROCHEMICAL TECHNIQUES 1977

Davos: 23–27 May 1977

The Symposium was held at the Congress Centre in Davos under the sponsorship of IUPAC, the Society for Clinical Chemistry, and various national Chemical and Analytical societies. The plenary lectures will be published in *Pure and Applied Chemistry*. There were about 600 participants at the meeting, from 30 different countries. It was particularly gratifying to find the Soviet Union very well represented, and to have participants from as far afield as Japan, Australia and Argentina.

At the opening ceremony there were speeches by the Chairman, Dr. W. MERZ, by Prof. R. BELCHER on behalf of IUPAC, Mr. MOROSANI on behalf of Davos itself, and Prof. H. ZOLLINGER, Rector of the Swiss Federal Institute of Technology, Zürich. These were followed by the presentation of the Pregl Medal to Prof. K. BIEMANN, the Feigl Prize to Prof. GRASSERBAUER, and Honorary Membership of the Austrian Society for Micro and Analytical Chemistry to Prof. E. PUNGOR (by Prof. M. KÜHNERT-BRANDSTETTER on behalf of the Society), and the award of the Division of Analytical Chemistry of the German Chemists Association to Dr. E. GRALLATH and Dr. P. TSCHÖPEL (by Prof. W. FRESENIUS on behalf of the Association). Prof. I. P. ALIMARIN then spoke for the three Honorary Presidents of the Symposium (Profs. BELCHER, LIEB, and himself). The rest of the opening morning was taken up by three inaugural lectures (by Profs. E. O. FISCHER, R. JUNGK and W. SIMON) on the achievements, social significance and future trends of analytical chemistry.

The scientific programme represented a significant break from the usual pattern of these symposia, in that a large number of speakers had been invited to give survey lectures in specialist fields, there was much less organic microanalysis, and a great diversity of papers on instrumental methods of analysis. Because of the large number of papers submitted, it was also found necessary to use poster presentation in parallel with the lectures. Poster presentation is a particularly useful method for papers which deal with a lot of detail rather than generalities, and is ideal for extended discussion, as much more time can be allotted. A further advantage is the flexibility conferred on usage of participants' time, since it is usually possible to find time to visit a poster display as well as not missing other items of interest. The use of posters seems likely to become more widespread, especially as the technique is further explored and appreciated.

The papers were classified into thirteen groups, dealing with general inorganic micro and trace analysis, general organic microanalysis, trace analysis for elements in organic matrices, separation and concentration of elements, separation and concentration of molecular species, spectral analysis, electrochemical methods, radiochemical methods, surface and probe analysis, micro and trace analysis of organic matrices, micro methods in biochemistry, and environmental analysis. Over 200 papers were presented.

The plenary lectures were on perspectives in inorganic micro and trace analysis (R. BELCHER), organic trace analysis (K. BEYERMANN), problems in the teaching of analytical chemistry (R. A. CHALMERS), computer methods for the spectroscopic identification of organic compounds (J. T. CLERC), history of microchemistry (W. FRESENIUS), development and use of bioanalytical systems based on mass spectrometry with ionization at atmospheric pressure (E. C. HORNING), microchemical methods in pharmaceutical analysis (J. F. K. HUBER), and preconcentration in inorganic trace analysis (Yu. A. ZOLOTOV). In addition there was a special lecture by K. BIEMANN on mass spectrometry in inorganic, bio- and cosmo-chemistry.

The main impression left by the general lecture programme was of the growing application of analysis to environmental problems, with special reference to ultratrace analysis, and the increasing use of surface and profile analysis in dealing with industrial and environmental samples. It was also evident that a good deal of classical analysis is still done, but tends to be confined to well trodden ground and not to seek solutions to 'difficult' problems. Even so, there were some novel ideas worth further development. Certainly the days are long past, when analysis meant simply determination of elemental composition, and the symposium made it abundantly evident that modern analysis demands identification and spatial location as well. The tasks are formidable, and thus we have the proliferation of specialized techniques and the specialists to operate them. There was also a great deal of evidence of the increasing traffic across the boundaries between scientific disciplines, and the collaboration of workers in various fields to produce answers to pressing and important problems.

The cynic, however, may be forgiven for wondering whether analysis is not on occasion beginning to follow the rest of chemistry into investigation of the trivial and the recording of numbers purely for the sake of filling in gaps in the computer data-banks, irrespective of whether the numbers are meaningful or not. If this is indeed what is happening, it is time that something was done about it, by a much more severe

refereeing system for publications, though the problem is likely to last as long as the 'publish or perish' system of promotion that engendered it. Perhaps 'publish *and* perish' might be better!

Though the quality of the papers had the unevenness that is inevitable unless the organizers of the scientific programme have the full text of the papers available (and not just the abstract) to aid them in selection, there were some excellent presentations and the general level was no worse than that of other conferences, and better than that of some. The conference handbook, containing the abstracts and programme, was a model of its kind (copies are available from Mettler Instrumente AG, CH-8606 Greifensee, Switzerland, price SFr 30).

Although nominally sponsored by various international and national organizations, the symposium could not have been held without the very real and practical sponsorship of a commercial organization—the firm of Mettler, which very generously advanced the funds necessary for the initiation of the symposium, seconded a team of very able and willing workers to run the secretariat and general organization, but very modestly kept itself and its contribution so thoroughly in the background that it is doubtful whether more than a handful of participants had any idea of how much the symposium owed to Mettler. Further support came from those firms which exhibited apparatus or contributed to the funds of the symposium or gave generously of time and facilities to members of the Organizing Committee. The staff of the Congress Centre also played a most valuable part, functioning with great efficiency.

Davos is a very pleasant place in which to hold a conference, and it says a great deal for this symposium that attendance at the lecture sessions was very high indeed. The social programme was generally enjoyed, highlights being the folklore evening and the final party. The next Symposium in the series, to be held in Graz in 1980, will mark the thirtieth anniversary of the inception of these very enjoyable and scientifically valuable symposia.

R. A. CHALMERS

FOURTH INTERNATIONAL SAC CONFERENCE

Birmingham: 17–22 July 1977

The Fourth SAC (Society for Analytical Chemistry) Conference, the largest ever held took place on the campus of the University of Birmingham. About 470 delegates and accompanying guests attended, representing 33 different countries and fully justifying the description of the Conference as 'International'. The Opening Ceremony was held in the Great Hall of the University. Mr. H. E. BROOKES, Chairman of the Local Committee, first introduced Sir ROBERT HUNTER, Vice-Chancellor of the University, whose words of welcome were followed by short addresses from Prof. J. C. TATLOW, Head of the Department of Chemistry, Prof. R. BELCHER, representing

IUPAC (and who delivered personal greetings from the President of the Division of Analytical Chemistry of IUPAC, Prof. N. TANAKA), Dr. G. W. C. MILNER, Chairman of the Conference Steering Committee, and Mr. D. W. Wilson, President of Analytical Division of The Chemical Society.

Prof. BELCHER delivered his Plenary Lecture on 'The Resurgence of Analytical Chemistry', and further Plenary sessions were held on the following days with papers by Dr. R. P. W. SCOTT on 'Highlights from Contemporary Liquid Chromatography', Prof. Yu. A. ZOLOTOV on 'Hybrid Methods of Analysis', and Prof. V. A. FASSEL on 'X-ray Excited Optical Luminescence and Phosphorescence and Their Analytical Apparatus'. All four Plenary Lectures will appear in full in *The Analyst*. A very full scientific programme occupied three days, with four simultaneous streams of about 100 half-hour papers covering the whole range of analytical techniques and applications. These sessions were complemented each day by Poster Sessions, an innovation at SAC Conferences, which enable several groups to present their work in pictorial form in the same room and interested delegates to have direct contact with the presenters. About 40 papers were presented in this form.

Following the main sessions each day, the specialist Subject Groups of the Analytical Division of The Chemical Society had organized Discussion Meetings on their particular techniques and interests. A further new feature at SAC Conferences was the inclusion of several Workshop Sessions, devoted to newer techniques and teaching methods. Working demonstrations were given and delegates had the opportunity of having detailed discussions on the principles and applications of these novel developments. Concurrently with the scientific programme, a comprehensive trade exhibition was held in the Laboratories on three floors. Over 50 companies took stands, including instrument manufacturers, consultants and publishers.

This SAC Conference at the University of Birmingham coincided with the retirement of Prof. RONALD BELCHER, who had been at Birmingham since 1948 and had held the Chair of Analytical Chemistry there for nearly 20 years. It was appropriate, therefore, that the Closing Ceremony on the Friday afternoon should include an appreciation of his work by one of his longest standing colleagues and friends, Dr. W. I. STEPHEN. In a moving eulogy, Dr. STEPHEN paid a personal tribute to RON BELCHER and gave his reflections about his mentor's early days at the University of Aberdeen and later in the research school he founded and fostered at Birmingham.

On the last evening, the most ambitious of the social events was held, namely an ox and pig roast in the grounds of High Hall. This provided a fitting climax to an extensive and most successful social programme that extended throughout the week. Other social programmes included: Grand Buffet, trips to Blenheim Palace and Tutbury, an outing on the Severn Valley Railway, a cruise on the River Severn, a wine tasting and a 16th Century Banquet and trips to Harveys of Bristol, the Skol Brewery at Wrexham, Berkeley Castle and Falconry Centre, Warwick and the Stratford Memorial Theatre and the Ironbridge Gorge Museum.

A. TOWNSHEND

INTERNATIONAL SYMPOSIUM ON MACROMOLECULES

Dublin: 17–22 July 1977

The Symposium took place in Trinity College (Dublin University) and University College (National University of Ireland). Attendance was about 300 active participants, with 80 accompanying persons, from 27 different countries. The scientific programme embraced 4 Plenary and 20 Lectures, and 142 short contributions. In the event one Lecturer and 32 contributors were unable to appear to present their papers.

The lectures are scheduled for publication as a special volume of *J. Polymer Sci. Part C* (Polymer Symposia). The contributed papers were preprinted and a limited number of copies of the Proceedings (2 vols., pp. 826) are available from the Chemical Laboratory, Trinity College, Dublin 2, Ireland. The themes of the Symposium were: Homogeneous polymerization by anions, zwitterions and coordination complexes; Fine Structure of polymers including biopolymers; Polymers as reagents and catalysts; and Polymer chemistry in polymer engineering.

The Symposium was organized in the now usual way, information being provided in 3 advance circulars issued approximately 17, 10 and 3 months earlier, with the full list of authors, titles and time-table available together with the preprinted Proceedings, at the meeting itself. The only feature calling for special comment was the avoidance of all clashes between lectures. This inevitably reduced attendance at the presentation of some of the contributed papers, but on the whole seemed acceptable and elicited much favourable comment.

D. C. PEPPER

5TH INTERNATIONAL CONFERENCE ON CRYSTAL GROWTH

Boston: 17–22 July 1977

The Fifth Conference represented a return to the birthplace, Boston, where this series was initiated in 1966. Subsequent meetings were held in Birmingham (1968), Marseilles (1971), and Tokyo (1974). Preliminary plans are underway for a 1980 meeting in Leningrad. The meeting was opened by Conference Chairmen R. A. LAUDISE and K. A. JACKSON; A. F. WITT, the President of the American Association for Crystal Growth; Chancellor P. E. GRAY of the Massachusetts Institute of Technology, the site of the meeting; and Governor M. S. DUKAKIS, representing the Commonwealth of Massachusetts. The program contained a total of 276 presentations. There were 9 plenary invited papers, starting off each morning's activities, followed by three parallel sections containing another 21 invited papers. An additional session containing six films rounded out a very full technical program.

The international flavor of the field is well indicated by the above-mentioned sequence of locations and by the fact that approximately 60% of the 525 attendees

came from abroad; this was the first time that local participation fell below 50%. The presentation of papers showed a similar ratio, perhaps indicative of a reduced crystal effort in the USA in comparison with other countries. The most outstanding impression of the meeting was the feeling that a maturation process is well under way in the field of crystal growth. There was, of course, the usual full range of presentations on broad area surveys, detailed crystal growth studies, development and production problems, theoretical treatments of the various aspects of growth, and computer simulation. Yet one could finally see the gap between theory and practice being on occasions successfully bridged. The discontinuities in the research–development–production sequence also seem to be on the verge of disappearing. This is not to say that the need for empiricism, and indeed 'art', on the part of the crystal grower is any less important; the most successful practitioner will remain to be the person who can 'listen' to needs of the growing crystal. But a greater unity of our wide field is occurring at the same time that academic courses are beginning to be given.

With so many presentations in three parallel sessions only a brief selection can be commented upon, implying no value judgments, but neither being completely at random. Most memorable was the strong showing of 'crystal growth on the computer'. In the invited plenary presentation by G. H. GILMER, a generalized Ising model was used to obtain many of the growth phenomena associated with dislocations, spiral growth, two dimensional nucleation, mobile adatoms and impurity and vacancy trapping in mono-component and AB alloy systems. A film of the computer output displayed on a color cathode ray tube gave an impressive demonstration of this powerful technique. J. P. van der EERDEN, D. KASHCHIEV, and P. BENNEMA presented a Monte Carlo simulation for the migration of crystallites on an amorphous substrate and M. S. VIOLA, K. A. van WORMER and G. D. BOTSARIS computer simulated 'Birth and Spread' two dimensional nucleation. A significant achievement was the development by J. S. LANGER of the linear Mullins–Sekerka instability into a rigorous nonlinear form, which successfully deals with the shape of dendritic interfaces. H. HÖCHE and H. BETHGE reported on the electron microscope observation of the motion of monatomic steps on cleaved NaCl surfaces and on the successful simulation in detail by the extended BCF theory.

A major step in chemical vapor phase transport calculations was the use of the flux function method by M. W. RICHARDSON and B. I. NOLÄNG. The flux function is derivable from basic thermodynamic data and provides the link between the vapor diffusion coefficient, the temperature gradient, and the transport rate. In an unusual application of holography, L. J. GILING, A. van der VEN and J. BLOEM determined the temperature distribution and flow pattern in an epitaxial silicon reactor by interference holography. J. M. OLSON and F. E. ROSENBERGER reported on studies of the convective instabilities in vertical cylinders filled with monocomponent or mixed gases; stable oscillatory modes with periods as long as 15 sec were noted.

Considerable interest was stimulated by W. E. LANGLOIS who presented digital simulation for fluid

flow in the Czochralski geometry. The usual TAYLOR–PROUDMAN column was obtained under the appropriate conditions, but the use of time dependence showed indefinite oscillation between qualitatively different configurations outside the column and stratification into four distinct regions within the column. N. KOBAYASHI gave a satisfying account of the same problem, including forced and thermal convection, in terms of five dimensionless parameters. C. D. BRANDLE bridged the gap between numerical modelling and actual Czochralski growth of $\text{Gd}_3\text{Ga}_5\text{O}_{12}$ by a water/glycerine fluid flow simulation. The floating zone geometry was examined by N. KOBAYASHI and by S. CORIELL and M. CORDES. The latter applied the Laplace–Young capillary equation to locate stability criteria for both axisymmetric and asymmetric perturbations.

Good complementary reviews were given of the Stepanov technique by P. I. ANTONOV, S. P. NIKANOROV and V. A. TATARCHENKO and of the edge-defined film-fed technique by T. SUREK, B. CHALMERS and A. I. MLAVSKY. The effect of defects on the generation lifetime in silicon ribbons was reported by K. YANG, G. H. SCHWUTTKE and T. F. CISZEK, who found dislocations to be harmful, but not twin boundaries.

The demonstration by K. A. JACKSON and C. E. MILLER that periodic melting (or etching) and regrowth can significantly improve the quality of a growing crystal has profound implications. It is clear that such periodic remelting and regrowth is inadvertently present in many growth techniques (temperature control oscillations, rotation axis not coincident with the thermal symmetry axis, etc.) and that this may have been helping crystal quality all along. Now that the phenomenon has been recognized, however, it should be possible to adjust the amplitude and period for optimum results.

In a rethinking of multilayer liquid phase epitaxy techniques, H. J. SCHEEL considered a variety of topologies, including configurations employing concentric screws. The turning of the apparatus plus screw moves the solution without any sliding contact, thus avoiding scratches and dust. Fifteen-layer structures with layer thickness of 0.1–10 microns were produced. A. RÄUBER reviewed the possible effect of an electric field during the melt growth of oxides with specific illustrations of impurity segregation and ferroelectric domain structure, among others.

Invited reviews of activities in the biological field by G. H. NANCOLLAS and of macromolecules by B. WUNDERLICH as well as a number of submitted reports indicated widespread activity with good progress in this difficult area. G. LOFGREN used the technique of quenching at varying cooling rates and examining the microstructure of mineralogically significant mineral and rock-forming combinations to provide analogies from which the growth history of natural minerals might be inferred. A. R. LANG reported on cathodoluminescence topography as a tool in his continuing study of diamonds.

Clearly much more time could have been used by J. B. MULLIN in his survey of impurity incorporation during vapor growth of GaAs and GaP. Considering equilibrium thermodynamics as well as non-equilibrium conditions, he clearly presented the many conflicting views which sooner or later will need to be resolved for

a unified comprehension of this technologically important problem. Using a novel approach, L. S. DARKEN, Jr. used Photothermal Ionization Spectroscopy to examine low level impurities in Ge down to the 10^{10} cm^{-3} level. The Ge sample is held at a temperature low enough to ensure adequate population of the ground state of the neutral impurity and high enough to allow thermal ionization of the bound excited state. The photoconductive response at energies corresponding to the transition from the ground to the excited state then permits identification of the impurities and estimates of their concentration.

Among the 'spectaculars', reports of unusually large or perfect crystals, the following may be singled out: R. L. COLLINS with dislocation free float zone silicon crystals of various orientation up to 90 mm in diameter; W. TOLKSDORF with what is probably the first large scale fully controlled flux process, yielding 6 cm inclusion-free YIG crystals in three weeks in a sealed accelerated crucible rotation environment employing flipping; G. A. SLACK and T. F. McNELLY with impressive 1 cm long and 3 mm diameter AlN crystals; R. M. WARE and M. WHITTAKER with 2 kg GaP and 4 kg GaAs crystals pulled under liquid encapsulation using a 'coracle', a ring of SiN which floats between the melt and the B_2O_3 , provides full interface control, and thereby diameter control of 50 ± 1 mm; and S. B. AUSTERMAN for 70 g low defect BeO crystals grown in six weeks in a flux transport system.

In summary, we can perhaps identify a lessening in the search for new crystals, or rather a reduced rate of finding them. There is a much heavier concentration on the improvement in size and quality of older crystals which are approaching technological maturity. This is resulting to some extent from the classical technique of varying parameters as directed by general principles (or at random if no guidelines appear at hand). Yet the increasingly successful interaction between theory, computer simulation, and modeling with experiment is clearly at work and can be expected to intensify with a most favorable prognosis for the future of crystal growth. Copies of the abstract booklet (US-\$2) and the proceedings (US-\$50) are available from Dr. A. F. ARMINGTON, ETSP, Hanscom AFB, Massachusetts 01731, USA. The proceedings will also appear as a regular volume of the *Journal of Crystal Growth*.

K. NASSAU

17TH IUPAC MICROSYMPOSIUM ON MACROMOLECULES. MEDICAL POLYMERS: CHEMICAL PROBLEMS

Prague: 15–18 August 1977

Entering by 17th Microsymposium into the second decade of their existence, Prague Meeting on Macromolecules opened also the door to an interdisciplinary exchange of ideas in a new discipline—biomedical polymer chemistry. Specialists in medical, biological and macromolecular sciences came to this meeting to discuss problems connected with the use of polymers in medicine. Two opening addresses were presented:

Prof. O. WICHTERLE, the IUPAC representative, informed the auditorium about the aim of IUPAC activities (in particular, about that of its Macromolecular Division) and its role in stimulating progress in both pure and applied disciplines of chemistry and related sciences. Dr. G. BENAGIANO, the official representative of the World Health Organization, acquainted all participants with the aims of WHO and with its broad spectrum of activities.

Attention and interest of all 212 active participants (117 scientists from 18 countries and 95 from Czechoslovakia) were concentrated on 9 invited lectures, on about 80 contributed papers (presented as short communications or posters) and on many discussion contributions presented at the three panel discussion sessions and at the same number of poster sessions. The Opening lecture by N. B. DOBROVA (Moscow, USSR) offered a survey of requirements as declared by medicine towards macromolecular chemistry with the aim that the biomedical materials and carriers should reach a higher level of their function in the organism and a lower level of risk involved in their uses. V. A. KROPATCHEV (Leningrad, USSR) devoted his lecture to problems of controlled synthesis and modification of water-soluble polymers (including polyelectrolytes) for various biomedical applications, and reviewed results obtained in his and other Soviet laboratories. The study of new polymer structures could initiate synthesis of more effective drugs and/or enhance also the knowledge of mechanisms of biochemical reactions.

H. RINGSDORF (Mainz, FRG) in his lecture demonstrated how polymeric drugs penetrated into cells of a living organism (piggyback endocytosis). The different endocytic activity of cells can be utilized in directing the polymeric drug into cells possessing an elevated endocytic activity. Immunological reactions may serve a similar purpose. Drug-antibody conjugates are immunologically specific and affect only cells having antigens which react with the respective antibody. The lecture by B. PHILIPP (Teltow-Seehof, GDR) dealt with polysaccharides and their derivatives as used in pharmacy and medicine, and in the field of nutrition. Several applications of polysaccharides (e.g. as plasma expanders and other surgical auxiliaries, as well as therapeutic agents and carriers) were reviewed and further progress was outlined in this field. J. D. ANDRADE (Salt Lake City, USA) suggested a hypothesis that solid-blood plasma interfaces of very low interfacial free energy should not significantly adsorb proteins and that such surfaces should be blood-tolerable. Surface properties of various gels are studied by a number of methods to test this hypothesis.

In his lecture, N. A. PLATÉ (Moscow, USSR) discussed the applicability of biospecific polymeric adsorbents to the binding of some blood components and toxic products of metabolism. Comparative analysis of his own and other data led to some conclusions about the relation between chemical nature of the macromolecular matrix and adsorption selectivity and capacity. The behaviour of biocompatible polyurethanes in a living body was the subject of a further lecture given by T. E. LIPATOVA (Kiev, USSR). She discussed mechanisms of their degradation and outlined ways for their rational synthesis with respect to the properties desirable for their medical applications. In his lecture, G. BENAGIANO

(Geneva, Switzerland) explained how a sustained release hormonal preparation for the long-term control of human fertility can be obtained using biodegradable and non-biodegradable polymers. Further progress is seen in physiologically programmed release systems in respect of menstrual cycle.

As S. D. BRUCK (Rockville, Maryland, USA) was not able to participate in the Microsymposium, his closing lecture was available only in writing: it advances a hypothesis that electrical conduction properties of natural biopolymers may be related to blood compatibility. Thin impervious carbon coatings when deposited on smooth surfaces give best results. Both substrate and hydrodynamic effects were found to play more important role in blood compatibility in the case of polyacrylamide hydrogels than surface energy forces the contribution of which seems not to be correlated with overall biological performance of synthetic materials. Instead of the preceding lecture, another lecture was presented by S. W. KIM (Salt Lake City, USA) who discussed problems connected with the adsorption of platelets on polymeric surfaces.

Almost all invited lectures and about a half of all contributed papers will be published in the *Journal of Polymer Science—Polymer Symposia*. The majority of contributed papers dealt with problems related to the main subjects of panel discussions: (a) chemical problems in therapeutical applications; (b) crosslinked polymers as implants; (c) role of polymer interfaces in blood compatibility. The thematic composition of 35 papers submitted for publication was a similar one.

B. SEDLÁČEK

V INTERNATIONAL CONFERENCE ON CHEMICAL THERMODYNAMICS

Ronneby: 23–26 August 1977

The Conference was held at Ronneby, Sweden, under the sponsorship of IUPAC and the Swedish National Committee for Chemistry. It was organized by a small committee of six members from the Thermochemistry Laboratory, Chemical Center, University of Lund and Department of Inorganic Chemistry, Royal Institute of Technology, Stockholm, assisted by the Chairman and the Secretary of the IUPAC Commission on Thermodynamics and Thermochemistry. The Conference was attended by 216 active participants, who came from 29 countries, on a worldwide basis representing five continents. It was held at the conference centre Ronneby Brunn, which offered accommodation and conference facilities under the same roof, thus giving ample opportunities for effective scientific and social contacts. The Conference was opened by Dr. R. OHLSON, President of Svenska Kemistsamfundet, and Prof. E. F. WESTRUM, Jr., Chairman of the IUPAC Commission on Thermodynamics and Thermochemistry. The proceedings of the Conference will not be published.

The Conference was concerned with four broad domains of chemical thermodynamics: thermodynamics of the physical change such as heat capacity and phase transition; thermodynamics of the chemical change; electrolyte solutions and non-ionic aqueous

systems; bio-thermodynamics. Each of the four Conference days began with a plenary lecture followed by poster sessions with about 30 presentations per day. During afternoons and evenings twelve more specialized workshops and discussion groups were arranged.

Plenary and 'Rossini' Lectures

The first plenary lecture was given by Prof. K. S. PITZER (USA) on 'Aqueous Solutions at Various Temperatures, Pressures, and Concentrations' in which was presented a scholarly and comprehensive discussion of the 'state of the art' of thermodynamics of aqueous electrolytes where substantial progress has been made during the last decade reflecting a revived interest of scientists for this field of research. In the second plenary lecture entitled 'The Hydrophobic Effect and the Organization of Living Matter' Prof. C. TANFORD (USA) gave an elegant resumé of the hydrophobic 'effect' starting by discussing solute-solvent interactions between hydrocarbons and water, continuing via micelle formation to the formation of cell membranes and possible models for their functioning.

The Commission on Thermodynamics and Thermochemistry decided in 1973 to institute a 'Rossini Lecture' to be given during the IUPAC sponsored International Conferences on Chemical Thermodynamics in recognition of the contributions of Prof. ROSSINI in the field of chemical thermodynamics. The 'Rossini Lecture' of this Conference was given by Dr. H. A. SKINNER (UK) on 'Thermochemistry of Organo-Transition Metallic Compounds'. He gave a review of the various techniques available for thermochemical studies of these often scarce and recalcitrant compounds and discussed patterns that have emerged for metal-carbon, metal-metal and metal-ligand bond strengths. The last plenary lecture was given by Prof. K. L. KOMAREK (Austria) on 'Thermodynamics of Liquid Alloy Systems' where he gave a stimulating discussion of the occurrence of molecular associates resulting from complex chemical interactions involving non-metallic bonding between unlike atoms in the melts. It was shown that such associates are expected to exist in the majority of binary systems of main group elements and the elements of groups IB and IIB.

Poster Sessions

In the four poster sessions 112 papers were presented out of 140 submitted to the Conference. Abstracts were collected and distributed in advance. The scientific quality of the papers was high and much work had been done by the presenters to give the displays attractive appearances. From the answers given to a questionnaire that the participants were asked to fill out it is clear that the arrangement with poster papers met with approval. A large majority indicated their preference for this method of presentation over the traditional approach of giving lectures.

Workshop Sessions

The workshop on the 'Thermodynamics of adsorbed layers' organized by P. GRAVELLE and J. ROUQUEROL (France) first dealt with definitions and formalism in adsorption thermodynamics, taking

advantage of the presence of Prof. D. H. EVERETT (UK), the past chairman of the IUPAC Commission on Colloid and Surface Chemistry who prepared the booklet on 'Definitions, Terminology and Symbols in Colloid and Surface Chemistry'. It was agreed that editors of journals should be encouraged to draw attention to this manual, its existence was not known to many participants of the workshop. The short document currently under preparation by the IUPAC Commission summarizing the correct ways to derive thermodynamic quantities from the main types of adsorption experiments will meet with the wishes expressed by the workshop attendants. In the second part of the workshop, experimental methods for the determination of thermodynamic quantities of adsorption were discussed and the feasibility of preparing tables of data in the field of adsorption thermodynamics was examined.

The workshop on 'Aqueous solutions at elevated temperatures and pressures' organized by L. G. HEPLER (Canada) included 15 contributions from scientists active in this field. Experimental methods were discussed and results of studies on various aqueous systems were summarized. Methods were presented for the evaluation of thermodynamic functions from experimental results and for the theoretical prediction of thermodynamic behaviour of aqueous electrolytes at elevated temperatures and pressures. The interest of oceanographers in this field was exemplified by discussions of the high pressure PVT properties of electrolyte solutions and of equilibria at high pressures in seawater.

The first session of the workshop 'Hydrophobic interactions—the current situation' (organizer F. FRANKS, UK) concentrated on the discussion of hydrophobic solvation, i.e. solute-water interactions at extreme dilutions. The experimental evidence for the particular properties of hydrocarbons or compounds containing hydrocarbon groups in aqueous solutions was reviewed and their interpretation on a molecular level was discussed. The question of suitable and correct standard states was examined. Although solution concentration is commonly expressed in terms of mole fraction or molality, it was pointed out that in order to compare correctly solute environments in different solvents, concentration should be expressed in moles per unit volume. The second session of the workshop dealt with interactions between solvated alkyl residues ranging from pairwise solute interactions to the complete substitution of solvation water by a hydrocarbon environment. It was agreed that interactions between alkyl groups in water result primarily from repulsions between water and solute and not from van der Waals attraction between solute molecules. Limited progress has been made in the molecular description of these hydrophobic effects.

The workshop 'The conformational thermodynamics of biological macromolecules' organized by R. L. BILTONEN (USA) and P. R. PRIVALOV (USSR) comprised six presentations. Experimental studies of conformational changes of proteins, nucleic acids, and phospholipids by precision differential scanning calorimetry were reviewed and mechanisms and cooperativity in conformational transitions were discussed. A statistical-thermodynamic interpretation of the excess heat capacity function of macromolecular systems was presented.

Discussion Sessions

The discussion on the 'Thermochemistry of organo-metallic compounds' was introduced with a short review of the present state of knowledge in this field by the chairman H. A. SKINNER. Experimental methods, combustion calorimetric as well as other calorimetric techniques, were discussed and possible improvements and developments of existing methods were suggested. The objectives of thermochemical studies, both theoretical and practical, were considered. In addition to the various scientific subjects treated during the discussion on 'Thermodynamic properties of metal systems' (chairman K. L. KOMAREK) educational problems in teaching metallurgical thermodynamics at universities were considered. It was argued that the needs of industry in this respect are largely ignored by academic institutions.

Two of the task groups of CODATA were presented in one afternoon session. L. V. GURVICH (USSR) discussed the work being done by the 'Task group on key values for thermodynamics' and H. J. WHITE, Jr. (USA), chairman of the recently formed 'Task group on the internationalization and systematization of thermodynamic tables' described this task group's planned activities and objectives. This session was followed by a discussion on 'Data needs of industry'. A brief survey of types of data needed by chemical industries as exemplified by BASF was given by O. RIEDEL (FRG). The importance of obtaining rapid information was stressed. The problem of obtaining more general access to the 'data banks' of industrial research laboratories was discussed and it was made known that this problem is presently being investigated by DECHEMA.

During the discussion on 'Hydrogen bonding problems in the solid state studied by heat capacity calorimetry', T. MATSUO and H. SUGA from Osaka University (Japan) presented a study of outstanding quality of phase transitions in two-dimensional hydrogen bonded crystals. Other topics discussed in 1 to 2 hours sessions were: 'How useful are commercial DSC-instruments in quantitative thermodynamic-thermochemical studies?' 'Methods for determination of enthalpies of vaporization/sublimation of compounds with low vapour pressure'; 'Nomenclature for thermodynamic quantities'; and 'What are the prospects of high precision calorimetry in the immediate future'. The attendance at the workshops and discussion sessions was high during all four days, varying between 40 and 70.

GERD OLOFSSON

IUPAC-IUPHAR SYMPOSIUM ON BIOLOGICAL ACTIVITY AND CHEMICAL STRUCTURE

Noordwijkerhout: 30 August-2 September 1977

This symposium, organized by the medicinal chemistry division of the Royal Netherlands Chemical Society, under sponsorship of IUPAC, IUPHAR, EFMC, FIP, KNCV, KNMP and NVPP, attracted 310 active participants from almost 30 different countries representing all 5 continents. They were housed in the friendly Leeuwenhorst congress center sufficiently

isolated for undisturbed informal contacts between participants.

The theme of the meeting was introduced by one of the pioneers of medicinal chemistry ARIENS (Netherlands), discussing the historic development of structure-action relationships. He stressed the importance of pharmacologists and chemists working together to reach a major objective of medicinal chemistry: the interpretation on a molecular level of the action of bioactive compounds. The insight obtained that way can then be used as the basis for creative design of novel compounds. This collaboration of chemists and pharmacologists should start when defining what are valuable lead compounds and the tests to be used before starting the synthesis of a series of compounds. SEEMAN (Canada) discussing the influence of neuroleptics on cell membranes showed that many non-specific effects are found in the micromolar concentration region, while specific effects occur in the nanomolar zone. It is a dangerous procedure to base any correlation analysis on non-specific effects. JANSSEN (Belgium) showed how in some areas the pharmacologists can accurately and precisely measure the profile of a series of compounds so that it is then possible after a penetrating study of the influence of molecular modifications to find new leads and after optimization to come to tailor-made therapeutics. It was stressed in the round table discussion later that in this important area better mathematical methods have to be developed to describe the correlations between chemical structure and pharmacological profile. The posters of NORDBY and HODGES (USA), TIMMERMANS and van ZWIETEN (Netherlands) and ÖTVÖS, TEGNEY, MAKSAI, PÁLOSI and RÖHRICHT (Hungary) discussing dissociation between central and peripheral effect of drug illustrated progress in this area.

In other cases however the pharmacologists can at best provide qualitative data maybe no more than some ranking order of activities. Modern mathematical techniques like discriminant analysis and pattern recognition, that can be used to describe such structure-activity relationships were topic of the lectures of FRANKE (GDR) and WIJNNE (Netherlands) and the poster of LEWI, van BEVER and JANSSEN (Belgium). Consequently the accuracy and precision of the biological data that can be provided determine the method best suited to describe the relationship between biological activity and chemical structure.

In those rare cases with biological data of a high accuracy and precision are available, for example from *in vitro* measurements on pure enzymes, the accuracy and precision of the description of the chemical structure may become the limiting factor. REKKER (Netherlands) pointed out that lipophilicity even when calculated using the best fragment constants may still be subject of systematic errors. The partition coefficient for a steroid as calculated differed by a factor of hundred from the partition coefficient for the parent compound and when practical for the most important derivatives. A poster by TOMLINSON (UK) showed that the retention times in high performance liquid chromatography using reversed phases are often more easily determined and form an attractive alternative to describe lipophilicity. Added to this comes a more basic problem. KUBINYI (FRG) in a stimulating lecture and HYDE, WHITE and WOOTTON (UK) in

a poster pointed to the fact that the usual way of describing the influence of lipophilicity by a parabola is only an approximation. They proposed more accurate descriptions that however need the use of non linear fitting procedures.

Most difficulties are, however, in the description of the steric size of substituents and molecules. New approaches were described by PURCELL (USA) and VERLOOP (Netherlands). The second lecturer used a programme based on molecular mechanics to find the least energy conformation of the substituents and used 5 parameters to describe this conformation. It thus assumes that a molecule binds to a receptor in its lowest energy conformation. However MARSHALL and FERRETTI (USA) showed that angiotensin II does not bind in the lowest energy conformation, as found in solution using NMR, to its receptor but in a conformation of higher energy. Similar results were reported by van OPTENBOSCH, EVRARD, DURANT, LEYSEN and LADURON (Belgium) for the binding of butyrophenones to the dopamine receptor and by MARSHALL and GORIN (USA) for binding of enkephaline to the opiate receptor. In contrast Dr. LINDBERG (Sweden) found the selective serotonin uptake inhibitor 2-(4-chlorophenyl)-1,1-dimethylethyl-2-aminopropanoate to bind in its lowest energy conformation, as determined by X-ray structure determination and by a molecular mechanical calculation. The situation seems best summarized by the study of HÖLTJE and LAMBRECHT (FRG) on binding of a series of compounds to the muscarinic receptor showing that conformational changes costing less than 2 kcal/mol can occur during binding.

It is important to realise that the mathematical models are nothing more than tools for analysing structure–activity relationships. PURCELL (USA) illustrated this in one of the round table discussions by referring to the report of the Humber committee (*Inf. Bull.* No. 49 (1975), p. 12), which stated that the estimation of the biological activity of an unknown compound by interpolation from known biological data, even when it is done using a computer, is not an inventive process in the legal sense of the patent law. The mathematics are needed however in view of the complexity of the biological processes. Only in a few cases it is possible to assign the observed differences in biological activity to one structural parameter only.

The different processes underlying the interactions of drugs with receptors were discussed by BURGEN (UK). Frequently the formation of the drug–receptor complexes is a multi-stage process and in some instances multiple receptors for a drug exist. TERENIUS (Sweden) illustrated in a very practical way what can be studied using isolated receptor preparations and presented methods to detect the presence of multiple receptors. His examples were mainly from the field of opiate receptors, an area rapidly explored recently. WILKINSON (UK) presented an interesting structure–activity study in the enkephaline series. The analogue Tyr–D-Ala–Gly–Phe–D-Met is an example of a compound much more active than the parent compound. The strategy for this study was a classical one: replacement of L-amino acids by the corresponding D-enantiomers and blockade of the terminal amino- and carboxyl-groups to increase resistance to proteolytic enzymes, illustrating that for the peptide area good methods to describe the structural parameters,

necessary for a more modern approach, are only in the process of being developed. The high cost price of the peptides remains a problem and research on the structure–activity relationships of the heterocyclic analgesics continues as was illustrated by a poster by HASSAN, AL-BADR, JADO and IBRAHIM (Saudi Arabia). This made the lecture of SOUDIJN (Netherlands) on how to translate physiologically active peptides into synthetic drugs with similar pharmacological activities and vice versa, a very timely one.

An interesting example on how the increased knowledge of enzymes stimulates the development of new methods for describing structure–activity relationships was given by HANSCH (USA). X-ray structure analysis of papain indicates that the binding site consists of regions where binding is mainly through hydrophobic interactions and other areas where binding is mainly through dispersion forces. The influence of substituents that have to bind in the hydrophobic regions is best described by the τ value, whereas the molar refractivity M_R serves better for those regions where dispersion forces are important. ZEELEN (Netherlands) discussing binding of steroids to the progesterone receptor pointed out that the difference in temperature dependance of binding of substituted progesterones and progestomimetics can be used to locate the hydrophobic areas on the receptor. In view of recent discussions on the exact nature of hydrophobic binding the lectures of SUGGETT (UK) and REKKER (Netherlands) were important.

The symposium was planned to give a critical appraisal. The lectures, the two round table discussions and the more than 50 posters, of which only a few could be mentioned in this report, all contributed to this process and made it a success. It demonstrated that medicinal chemistry now has at its disposal excellent techniques to analyse the biological data from a congeneric series of compounds. It stressed the importance of close cooperation with the synthetic chemists at a very early stage to ensure that those derivatives are synthesized that will provide the maximum information. It proved that a close cooperation with pharmacologists is essential and highly stimulating. It clearly showed the imbalance in today's study of structure–activity relationships. Too much attention is paid to improved parameterization. The classical HANSCH approach has been too successful leading to neglect of other important fields. It was already mentioned that methods to describe the relationship between pharmacological profile and chemical structure need further development. Discriminant analysis, which has potential for handling crude biological data, deserves a more thorough exploration. Quantum chemical and molecular mechanical calculation of conformational energies should not only give the lowest energy conformation but the others as well.

F. J. ZEELEN

26TH INTERNATIONAL CONGRESS OF PURE AND APPLIED CHEMISTRY

Tokyo: 4–10 September 1977

The 26th International Congress of Pure and Applied Chemistry took place in Tokyo, Japan, under the

auspices of Science Council of Japan, The Chemical Society of Japan, Pharmaceutical Society of Japan, and The Agricultural Chemical Society of Japan.

Three thousand one hundred and ninety-one scientists attended the Congress from 54 countries. There were also 111 accompanied members. Donation from Japanese industries in addition to the funds from Japanese Government and registration fees made it possible to run the Congress successfully and to invite lecturers of the sessions and chemists from developing countries.

Following the registration and an informal get-together on 4 September, the Opening Ceremony was held in the NHK (Japan Broadcasting Company) Hall on 5 September. After the declaration of the opening of the Congress by Prof. H. AKAMATU (Chairman, Organizing Committee), Prof. G. SMETS (President, IUPAC) delivered an address. The participants were welcomed by Prof. Y. OCHI (President, Science Council of Japan) and Prof. F. EGAMI (President, The Chemical Society of Japan). Prof. K. WADACHI (President, The Japan Academy) congratulated the success of the Congress.

Plenary lectures were delivered after the Opening Ceremony at the same place.

Opening lectures, session lectures, invited papers, and contributed papers were presented starting in the afternoon of 5 September.

A reception was held in the evening of 6 September. About 900 participants were received by the President of Science Council of Japan and the Presidents of the sponsoring societies. A banquet was held in the evening of 9 September and was attended by 533 participants. Dr. R. W. CAIRNS (Past President, IUPAC) spoke on behalf of IUPAC and Dr. G. LARINKARI extended invitation to the 27th IUPAC Congress to be held in Helsinki in 1979. Prof. H. ZOLLINGER (Vice-President, IUPAC) spoke on behalf of the participants.

There were also 5 scientific visits, ladies programs, and an exhibit of scientific instruments.

The scientific program included 1250 papers in total. There were 2 plenary lectures, 11 opening lectures, 85 session lectures, 19 invited papers, and 1133 contributed papers. These papers were read in 9 sessions at 23 lecture halls. Among the 9 sessions, 5 were devoted to chemistry for the welfare of mankind and were called the joint symposia. The joint symposia were divided into the sessions of selectivity and specificity in chemical reactions, phase boundaries and multiphase systems, biologically active substances, separation and detection of trace species, and modern aspects of industrial materials and resources. There were also the sessions of physical chemistry, analytical chemistry, organic chemistry, and macromolecular chemistry.

Plenary Lectures

Two plenary lectures, 'Chemistry, Macromolecules, and the Needs of Man' and 'Pure and Applied Photochemistry', were presented by Prof. P. J. FLORY (Stanford University) and Sir GEORGE PORTER (Royal Institution, UK), respectively. Prof. FLORY stressed the importance of chemistry as the science most concerned with molecules and pointed out the cultural and technological function of chemistry.

Macromolecules are singularly important in both respects. Sir GEORGE PORTER talked on the important role of photochemistry both in the large scale and in the smaller, laboratory scale, and the recent progress in photochemical techniques which made it possible to study the processes occurring in very short intervals of time. The growing industrial and environmental importance of photochemistry and the use of solar energy as the greatest of all potential applications of photochemistry were singled out.

Selectivity and Specificity in Chemical Reactions

The session of Selectivity and Specificity in Chemical Reactions was opened by a lecture of Prof. E. O. FISCHER (Technische Universität München) discussing on 'Selectivity and Specificity in Chemical Reactions of Carbene and Carbyne Metal Complexes'. In this lecture, selectivity in the reactions of metal-carbene and metal-carbyne was discussed on the light of nucleophilicity of the reactants. There was another opening lecture by Prof. N. M. EMANUEL (Academy of Sciences of USSR) on 'Selectivity Problems in Chain Radical Reactions'. Various aspects controlling selectivity of chain radical reactions were thoroughly discussed in this lecture. Ten session lectures were given in this session. They were 'Cryptates: Selective Macrocyclic Ethers' by Prof. J. M. LEHN (Université Louis Pasteur), 'Chiral Ionophores' by Prof. V. PRELOG (Federal Institute of Technology, Zürich), 'Stereo- and Regio-Specificity in Organic Synthesis Promoted by Metal Ions' by Prof. A. M. SARGESON (Australian National University), 'Asymmetric Transformation of α -Amino Acids Promoted by Optically Active Metal Complexes' by Prof. S. YOSHIKAWA (University of Tokyo), 'Selectivity in Heterogeneous Catalytic Oxidation' by Dr. J. HABER (Research Laboratory of Catalysis and Surface Chemistry, Poland), 'Metal Cluster Chemistry' by Prof. E. L. MEUTTERTIES, (Cornell University), 'The Synthesis and Chemistry of Unusual Metalloporphyrins' by Prof. J. P. COLLMAN (Stanford University), 'New Reagents for Organic Syntheses' by Prof. K. B. SHARPLESS (Massachusetts Institute of Technology), 'Active Sites for Hydrocarbon Catalysis on Metal Surfaces' by Prof. G. A. SOMORJAI (University of California, Berkeley), and 'Spin- and Orbital-Symmetry Controls of Organic Reactions' by Prof. T. FUENO (Osaka University). In addition, 3 invited papers and 102 contributed papers were presented in this session.

Phase Boundaries and Multiphase Systems

The session of Phase Boundaries and Multiphase Systems was opened by a lecture of Prof. S. SOURIRAJAN (National Research Council of Canada), on 'The Science of Reverse Osmosis—Mechanisms, Membranes, Transport, and Applications'. The preferential sorption capillary flow mechanism for reverse osmosis separation and the potential application of this general technique in industrial, biomedical, and other fields were discussed in this lecture. Nine session lectures were given in this session. They were 'Elementary Processes in Reactions at Metal/Gas Interfaces' by Prof. G. ERTL (Universität München), 'Mechanism of Enantioface Differentiating Hydrogenation of Modified Nickel Surfaces' by Prof.

I. YASUMORI (Tokyo Institute of Technology), 'Biopolymer Synthesis on Solid Supports' by Prof. R. B. MERRIFIELD (The Rockefeller University), 'On Some Reactive Polymers and Immobilized Enzymes' by Prof. G. MANECKE, (Universität Berlin), 'Industrial Application of the Immobilized Enzyme System' by Dr. I. CHIBATA (Tanabe Seiyaku Co.), 'Kinetics and Mechanism for Organic Reactions in the Presence of Micelle-Forming Ionic Surfactants' by Prof. E. H. CORDES (Indiana University), 'Structure and Properties of Liquid Crystals' by Prof. G. H. BROWN (Kent State University), 'Recent Studies of Liquid Crystal and Cell Membranes' by Prof. D. CHAPMAN (Chelsea College), and 'Structural Aspects of Asymmetric Synthetic Polymeric Membranes' by Dr. R. KESTING (Chemical Systems, Inc.). In addition there were 2 invited papers and 104 contributed papers in this session.

Biologically Active Substances

The session of Biologically Active Substances was opened by a lecture of Prof. Y. HIRATA (Nagoya University) on 'Structure and Biological Activities of Several Natural Products'. Special emphasis was put on the relationship between structure and biological activities of natural products, toxicity and bioluminescence being taken as examples. The following seven session lectures were presented: 'A Chemical Basis for the Carcinogenicity of Benzo[a]pyrene—the Kay Region Theory' by Prof. T. R. FUKUTO (University of California, Riverside), 'Steric effects in Quantitative Structure—Activity Relationships' by Prof. T. FUJITA (Kyoto University), 'Chance and Design in Biosynthesis' by Prof. A. J. BIRCH (Australian National University), 'Reactions of Bisulfite, an Environmental Chemical, with Nucleic Acids and Other Biological Substances' by Prof. H. HAYATSU (University of Tokyo), 'Effects of Pesticides and Related Compounds on the Environment' by Prof. F. KORTE (Technische Universität München), 'Metabolic Studies of the Gibberellin Plant Hormones' by Prof. J. MacMILLAN (University of Bristol). There was one invited paper and 78 contributed papers in this session.

Separation and Detection of Trace Species

The session of Separation and Detection of Trace Species was opened by a lecture of Prof. Y. KITANO (Nagoya University), titled 'Dissolved State Distribution, and Migration of Trace Metals in the Hydrosphere'. Rapid movement of trace metals with rapid circulation of water on the earth's surface and geochemical balance of major and minor chemical species were discussed in this lecture. There were 9 session lectures in this session. They were 'Lead in the Aquatic Environments' by Prof. T. J. CHOW (University of California, La Jolla), 'Analysis of Naturally Occurring Waters for Toxic Metals Using Combined Ion—Exchange—Solvent Extraction Procedures' by Prof. J. KORKISCH (University of Vienna), 'Polarography and Voltammetry in Studies of Toxic Metals in Man and His Environment' by Prof. H. W. NÜRNBERG (Nuclear Research Center, Jülich), 'Behavior of Some Trace Chemical Constituents in Estuarine Waters' by Prof. J. D. BURTON

(The University, Southampton), 'Automated Analysis in Medical Chemistry' by Dr. R. E. THIERS (Bio-Science Laboratories, USA), 'Elemental Analysis of Biological Specimens by Electron Probe X-Ray Microanalysis' by Prof. V. MIZUHIRA (Tokyo Medical and Dental University), 'Problems, Limitations, and Future in the Analytical Characterization of High-Purity Materials' by Prof. G. TÖLG (Max-Planck Institut für Metallforschung), 'Ultramicroanalysis of Enzymes and Substrates by Enzymatic Amplification Reactions. Enzymatic Cycling' by Prof. T. KATO (University of Tokyo), and 'Inductively Coupled Plasma—Atomic Emission Spectroscopy' by Prof. V. A. FASSEL (Iowa State University). In addition 3 invited papers and 61 contributed papers were read in this session.

Modern Aspects of Industrial Materials

The session of Modern Aspects of Industrial Materials and Resources was opened by a talk of Prof. M. CALVIN (University of California, Berkeley), titled 'Chemistry, Population, Resources'. The important role of chemistry in developing the material and energy required by the growing population in the future was emphasized in this lecture. The following 9 session lectures were given in this session: 'Trends in Research and Development of Coal Conversion to Liquid Fuels and Basic Chemicals in Europe' by Prof. H. SCHULZ (University of Karlsruhe), 'Synthesis and Properties of Aromatic and Extended-Chain Polyamides' by Dr. P. W. MORGAN (E. I. du Pont de Nemours & Co.), 'New Progress in Biomedical Materials' by Prof. D. J. LYMAN (University of Utah), 'Microbial Enzymatic Processes for Amino Acid Production' by Prof. H. YAMADA (Kyoto University), 'Toxicological Studies on Single Cell Proteins' by Dr. S. GARATTINI (Istituto di Ricerche Farmacologiche 'Mario Negri'), 'Studies of the Structures of Coal and Coal Hydrogenation Process' by Prof. G. TAKEYA (Hakodate Technical College), 'Carbons for Use in Bioengineering' by Dr. J. C. BOKROS (General Atomic Company, USA), 'Gas Phase Diffusion and Surface Reactions in the Chemical Vapour Deposition of Silicon' by Prof. BLOEM (University of Nijmegen), 'Silver and Copper Ion Conductors in the Solid State' by Prof. T. TAKAHASHI (Nagoya University). In addition, 49 contributed papers were presented in this session.

Physical Chemistry

The session of Physical Chemistry was opened by a lecture of Prof. C. A. McDOWELL (University of British Columbia), on 'Contemporary Perspectives in Physical Chemistry'. In this lecture, new important developments in physical chemistry were discussed with special reference to photoelectron spectroscopy, application of lasers, microwave double resonance spectroscopy, and laser magnetic resonance studies of free radicals. Eleven session lectures were given in this session. They were 'Microwave Spectroscopy of Short-Lived Molecules' by Prof. S. SAITO (Institute of Molecular Science, Japan), 'Applications of Lasers in Chemical Spectroscopy and Dynamics' by Prof. R. M. HOCHSTRASSER (University of Pennsylvania), 'Advances in Photoelectron Spectroscopy' by Prof.

D. W. TURNER (Oxford University), 'Non-Stoichiometry and Structural Disorder in Some Families of Inorganic Compounds' by Prof. A. MAGNÉLI (University of Stockholm), 'Molecular Reaction Dynamics by the Crossed Molecular Beam Technique: a Few Recent Examples' by Prof. R. B. BERNSTEIN (University of Texas, Austin), 'Chemical Applications of Ionizing Excited Atom-Molecule Collisions' by Prof. A. NIEHAUS (Universität Freiburg), 'Microwave Spectral Studies of Interstellar Molecules' by Prof. R. D. BROWN (Monash University), 'Magnetic Resonance—Contemporary Developments and Applications' by Prof. J. S. WAUGH (Massachusetts Institute of Technology), 'Electronic Structures of Aromatic Hydrocarbons with High Spin Multiplicities in the Electronic Ground State' by Prof. K. ITOH (Osaka City University), 'Studies of Reaction Dynamics by Laser-Induced Fluorescence' by Prof. R. N. ZARE (Columbia University), and 'Picosecond Time-Resolved Measurements of Vibrational Energy Transfer and Relaxation Phenomena in Liquid Systems' by Prof. W. KAISER (Technische Universität München). There were 2 invited papers and 114 contributed papers in this session in addition to the main lectures.

Analytical Chemistry

The session of Analytical Chemistry was opened by a lecture of Dr. P. D. LaFLEUR (National Bureau of Standards, USA), on 'Analytical Chemistry: Present Status and Future Development'. The importance of analytical methods detecting trace species was emphasized with special reference to the welfare of mankind. Not only the analysis of elements but that of the form in which the element is included were discussed with emphasis on analytical methods of organic materials. Eleven session lectures were given in this session. They were 'Characterization of Ceramics with Special Reference to Electronic Ceramics' by Prof. H. YANAGIDA (University of Tokyo), 'Ion Microanalysis' by Prof. G. SLODJAN (Université de Paris-Sud), 'Modern Methods of Surface Characterization' by Prof. A. BENNINGHOVEN (Universität Münster), 'General Purpose Microcomputers in Laboratory Automation' by Prof. R. N. REILLEY (University of North Carolina), 'Sequential Fast Kinetics by Relaxation: Application in Chemistry and Biochemistry' by Prof. J.-E. DUBOIS (Université Paris VII), 'Correlation NMR Spectroscopy and Its Applications' by Prof. Y. ARATA (University of Tokyo), 'Chelating Agents for Metal Buffering and Analysis in Solution' by Prof. A. E. MARTELL (Texas A&M University), 'Complex Formation in Solvent Extraction' by Prof. Y. A. ZOLOTOV (Academy of Sciences, USSR), 'Current Topics in Organic Mass Spectroscopy' by Prof. F. W. McLAFFERTY (Cornell University), 'Structural Characterization of Copolymers by Pyrolysis-Gas Chromatography' by Prof. S. TSUGE (Nagoya University), and 'Developments in Atomic Fluorescence and Emission Spectroscopy' by Prof. T. S. WEST (Macauley Institute for Soil Research). In addition, 2 invited papers and 144 contributed papers were read in this session.

Organic Chemistry

The session of Organic Chemistry was opened by a lecture of Prof. C. D. RITCHIE (State University of New York at Buffalo), on 'Problems in Understanding Orders of Nucleophilic Reactivities'. A correlation between the observed rate constants and the amounts intrinsic to nucleophiles and to cations was discussed in this lecture. The following 9 session lectures were read in this session: 'Quest for the Pentagonal Dodecahedrane' by Prof. L. A. PAQUETTE (Ohio State University), 'Strategy in Organic Synthesis' by Prof. T. SAKAN (Osaka City University), 'Novel Preparative Methods for Natural Product Synthesis' by Prof. D. SEEBACH (Eidgenössische Technische Hochschule, Zürich), 'Stereocontrolled Synthesis of Penicillin and the Consequences Thereof' by Prof. J. E. BALDWIN (Massachusetts Institute of Technology), 'Physical Methods and Structures of Bioactive Compounds' by Prof. K. NAKANISHI (Columbia University), 'The Deductive Solution of Chemical Problems by Computer Programs on the Basis of a Mathematical Model of Chemistry' by Prof. I. UGI (Technische Universität München), 'Stereo-electronic Control in Hydrolytic Reactions' by Prof. P. DESLONGCHAMPS (Université de Sherbrooke), 'Chiral Methyl Groups as a Tool for Studying Terpene Biosynthesis' by Prof. D. ARIGONI (Eidgenössische Technische Hochschule, Zürich), 'Biosynthesis of Aspulvinones, Metabolites from *Aspergillus terreus*' by Prof. S. SETO (Tohoku University). In addition, 3 invited papers and 245 contributed papers were read in this session.

Macromolecular Chemistry

The session of Macromolecular Chemistry was opened by a lecture of Prof. G. SMETS (K. Universiteit te Leuven), on 'Photochemical Effects in Photochromic Systems'. A new approach for the examination of the solid state of polymer networks was discussed by taking an example of a copolymer of ethyl acrylate with bis-methacrylate of indoleninospirobenzopyran which colors strongly on irradiation due to ring-opening but returns to the original colorless structure thermally or photochemically. There was another opening lecture in this session given by Prof. H. BENOIT (Centre de Recherches sur les Macromolécules), on 'Application of Neutron Low Angle Scattering to Polymer Characterization'. The molecular conformations of polymers in solution as functions of concentration and molecular weight, together with the conformation of A-B type block polymers, were discussed in this lecture. There were 10 session lectures in this session. They were 'Polyquinolines: Versatile Polyaromatics with Diverse Properties' by Prof. J. K. STILLE (Colorado State University), 'Design of Some Highly Effective Polymeric Reagents' by Prof. V. A. KABANOV (Moscow Lomonosov University), 'No Catalyst Alternating Copolymerization via Zwitterion Intermediates' by Prof. T. SAEGUSA (Kyoto University), 'Synthesis of Functional Condensation Polymers' by Prof. N. OGATA (Sophia University, Japan), 'Photostabilization of Macromolecules by Excited State Quenching' by Prof. D. M. WILES (National Research Council of Canada), 'Viscoelastic

Properties of Dilute Polymer Solutions' by Prof. J. D. FERRY (University of Wisconsin), 'Recent Developments in the Use of Polymers as Reactants in Organic Reactions' by Prof. C. G. OVERBERGER (University of Michigan), 'Use of Random Copolymers to Determine the Helix-Coil Stability Constants of the Naturally Occurring Amino Acids' by Prof. H. A. SCHERAGA (Cornell University), 'Studies of Structure and Dynamics of Solid Polymers by Elastic and Inelastic Neutron Scattering' by Prof. E. N. FISCHER (Johannes Gutenberg Universität Mainz), and 'Molecular Organization in Solid Polymers. Conformational Aspects' by Prof. P. CORRADINI (Università di Napoli). In addition, 3 invited papers and 239 contributed papers were presented in this session.

All the plenary and opening lectures and most of the session lectures will be published in the IUPAC Journal *Pure and Applied Chemistry* in 1978 and as separate volumes by Pergamon Press, Oxford.

M. OKI

VIII INTERNATIONAL CONFERENCE ON ORGANOMETALLIC CHEMISTRY

Kyoto: 12-16 September 1977

The Conference was held at the Kyoto International Conference Hall under the sponsorships of IUPAC and the Ministry of Education, Science and Culture, Japan. Soon after the Seventh Conference held at Venice in 1975, the International Advisory Committee (43 members from 17 countries) and the Japanese Organizing Committee (JOC) were established. Under the auspices of the Chemical Society, Japan, Catalysis Society of Japan, the Society of Polymer Science, Japan, and the Society of Synthetic Organic Chemistry, Japan, JOC started for the arrangements and selection of Plenary Lecturers with the collaboration of four sub-committee members. Extremely valuable suggestions from members of the International Advisory Committee sent to us were gratefully appreciated. There were 642 participants (212 from abroad) from 23 countries; the largest groups came from USA and Germany.

At the Opening Session the Chairman of the Conference, Prof. Y. ISHII welcomed participants and stressed much more increasing important role of organometallic chemistry for the development of science and engineering. Prof. F. EGAMI, the President of the Chemical Society, Japan, expressed his gratitude for many attendants on behalf of four societies. Finally, Prof. K. YAMAZAKI, an official representative of IUPAC, presented greetings and described the main activities of IUPAC.

Organometallic chemistry has become a very wide domain of research. In order to maintain the Conference in reasonable size, it was limited to six topics: structure and bonding, synthesis, reaction and mechanism, organic synthesis via metal compounds, homogeneous catalysis and biological and environmental aspects. Keeping with the high standard of the Organometallic Chemistry Conference, the Conference thus restricted was still big enough to justify a broad meeting, and therefore, JOC determined to have two Opening Lectures, thirteen Session Lectures and 160 oral presentations as Contributed Papers, which were selected among 299 Contributed Papers. R. HOFFMANN (USA) enthusiastically presented his theoretical studies on the coordination of molecules to transition metal centers, which contributed extensively to the fundamental knowledge of organometallic chemistry. G. WILKE (Germany) started his Opening Lecture by introducing W. REPPE's pioneering work on the catalytic synthesis of cyclooctatetraene from acetylene and reviewed the organo-transition metal compounds as intermediates of homogeneous catalytic reactions, many of which were found in his Institute.

The other Session Lectures, all of high scientific level, were given by:

R. BAU (USA), Neutron diffraction studies of metal hydride complexes. F. CALDERAZZO (Italy), Synthesis and reactivity of carbon-bonded transition elements. H. C. CLARK (Canada), Isocyanide, carbene, and related chemistry of palladium (II) and platinum (II). M. L. H. GREEN (UK), Studies of synthesis, reactivity and mechanisms in organomolybdenum and tungsten chemistry. R. F. HECK (USA), New application of palladium in organic syntheses. M. ISHIKAWA (Japan), Photolysis of organopolysilanes. Generation and reactions of silicon-carbon double-bonded intermediates. M. F. LAPPERT (UK), Unusual metal alkyls. A. NAKAMURA (Japan), Enantioselective reactions through chiral metal-carbene intermediates. J. F. NORMANT (France), Stoichiometric versus catalytic use of copper (I) salts in the synthetic use of main group organometallics. O. A. REUTOV (USSR), Mechanisms of the substitution reactions of non-transition metal organometallic compounds. H. SCHMIDBAUR (Germany), Classical and novel ylide systems in organometallic chemistry. A. E. SHILOV (USSR), Activation of saturated hydrocarbons by transition metal complexes. M. TSUTSUI (USA), New trends in the chemistry of organometalloporphyrins.

These fifteen Plenary Lectures have been published in the IUPAC journal *Pure and Applied Chemistry* and as a separate symposium volume by Pergamon Press, Oxford.

YOSHIO ISHII

FORTHCOMING IUPAC-SPONSORED SYMPOSIA

18TH MICROSYMPOSIUM ON MACROMOLECULES: SYNTHETIC AND SEMISYNTHETIC POLYMER CATALYSTS AND AFFINANTS

Prague: 10–13 July 1978

The Eighteenth Microsymposium, sponsored by IUPAC, will be held at the Institute of Macromolecular Chemistry, Prague under the auspices of Czechoslovak Academy of Sciences and Czechoslovak Chemical Society. Accommodation has been reserved at modern halls of residence 'Kajetánka' in single or twin-bedded rooms (with shower). Single accommodation is limited and will be allocated in the order of receipt of application forms.

Scientific Programme

The Microsymposium would aim to review the most promising ways of synthesizing polymers with intended catalytic and affinity functions. It should also help to elucidate the role of the polymeric carrier (its structure, chemical and physical properties) in binding active groups and in the functional mechanism of final products. The following topics will be covered:

1. *Carriers of Catalytic Functions.* Polymers as supports for 'homogeneous' catalytic centres and as carriers of metal complexes.
2. *Carriers of Enzymatic Functions.* Attachment of enzymes to polymer carriers. Enzyme entrapment into polymer matrices. Multicomponent enzymatic systems on solid supports. Models of biochemical functions.
3. *Carriers of Affinity Functions.* Polymers as carriers of affinity functions to be used in macromolecular science, enzymology, immunology etc. for analysis (affinity chromatography), isolation (e.g. of enzymes and enzyme inhibitors), and synthesis (on polymer matrices).

The following scientists have accepted to present Invited Lectures which will be published in the official IUPAC journal *Pure and Applied Chemistry* and (possibly) simultaneously as a separate Symposium Volume by Pergamon Press, Oxford:

- C. G. OVERBERGER (USA): Some Observations on Polymeric Catalysts
F. S. DYACHKOVSKII (USSR): The Synthesis and Catalytic Properties of Complexes of Transition Metals Immobilized on the Surface of the Hydrocarbon Polymer Backbone

P. H. TEYSSIE (Belgium): Specific Goals for Polymeric Catalysts; the Example of Biometallic μ -Oxoalkoxides

M. IMOTO (Japan): Radical Polymerization of Methyl Methacrylate with Macromolecule in the Presence of Aqueous Solution of Cupric Ion

I. BEREZIN (USSR): The Effect of Polymeric Matrix on the Functions and Properties of Immobilized Enzymes

G. V. SAMSONOV (USSR): Thermodynamical and Kinetic Regularities in the Interaction between Synthetic and Semisynthetic Polymers with Enzymes during their Immobilization and Modification

R. S. NEZLIN (USSR): The immunosorbent Method of the Separation and Determination of Antibodies and Antigens

C. R. LOWE (UK): Immobilized Nucleotides and Coenzymes for Affinity Chromatography

K. MOSBACH (Sweden): Immobilized Enzymes in Analytical Chemistry.

Contributed papers (short communications and poster contributions) are invited from intending participants and these will be grouped in appropriate scientific sessions. Time will be reserved for panel discussion devoted to problems and prospects of industrial applications of polymeric catalysts. Abstracts of contributions should be prepared in accordance with instructions obtainable from the address given at the end of this announcement. The Book of Abstracts will be sent out in advance to participants. Manuscripts of contributed papers may be accepted for publication in the *Journal of Polymer Science – Polymer Symposia* and should therefore be prepared in accordance with 'Information for Contributors' of the said journal.

Correspondence

Enquiries and correspondence concerning the Symposium should be addressed to: P.M.M. Secretariat, c/o Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, 162 06 Prague 616, Czechoslovakia. Tel: 360341, Cable: Macro Prague, Telex: 122019 IMCPC.

6TH DISCUSSION CONFERENCE ON MACROMOLECULES: CHROMATOGRAPHY OF POLYMERS AND POLYMERS IN CHROMATOGRAPHY

Prague: 17–21 July 1978

The Conference, sponsored by IUPAC, will be held at the Institute of Macromolecular Chemistry, Prague

under the auspices of Czechoslovak Academy of Sciences and Czechoslovak Chemical Society. Details of accommodation are the same as for the 18th Microsymposium (see p. 59).

Scientific Programme

The scope of the Conference will comprise: Fundamental (theoretical and experimental) aspects of separation of synthetic and natural macromolecules by various chromatographic techniques according to their size, composition or structure. General chemical and physical problems connected with the use of polymer sorbents and high-molecular weight stationary phases in gas, liquid, exclusion and ion-exchange chromatography. (Application of chromatography as a conventional analytical tool will not be included.) The following topics will be covered:

1. *Chromatography of Polymers*. Its mechanism and dynamics. Prospects and limitations of chromatographic methods, including also special separation techniques such as hydrophobic, affinity, ion-exchange, ligand-exchange and thin layer chromatography, field-flow fractionation etc. New concepts in instrumentation.

2. *Polymers in Chromatography*. Polymer sorbents with desired chemical and physical structure and properties: chemical problems of their preparation. Polymeric stationary phases: chemically bonded stationary phases in liquid chromatography; molecular probes in gas chromatography and the structure of polymer used as a stationary phase.

3. *Theory of Chromatography*. New theoretical approaches to individual chromatographic methods with special attention to the influence of the structure of the sorbent and/or stationary phase on the retention behaviour of high- and low-molecular weight solutes and on separation efficiency.

The following have accepted invitations to present Invited Lectures:

J. C. GIDDINGS (USA): Field-Flow Fractionation of Polymers

J. V. DAWKINS (UK): Theory of Gel Permeation Chromatography, Mechanism of Separation and the Influence of Polymer-Sorbent Interaction

C. QUIVORON (France): Theoretical and Experimental Aspects of Fractionation Mechanism in Liquid Chromatography on Macromolecular Stationary Phases (Gel or Bonded Chains)

H. P. GREGOR (USA): Use of Oleophilic Ion-Exchange Absorbents for Separations of Molecules of Biological Interest

K. H. LIESER (FRG): New Ion Exchangers: Preparation, Properties and Application

J. F. K. HUBER (Austria): Retention of Mechanism in Liquid Chromatography

G. V. SAMSONOV (USSR): Irreversible Dynamics of Sorption and Chromatography on Ion Exchangers with a Surface Layer of Polyelectrolyte

P. MOHR (DDR): Molecular Aspects of Affinity Chromatography

B. G. BELENKIJ (USSR): Adsorption Chromatography of Polymers

H. INAGAKI (Japan): Newer Applications of Thin Layer Chromatography to Polymer Chemistry

J. R. MILLAR (USA): Some Aspects of Organic Polymer Sorbents and their Evaluation

B. H. J. HOFSTEE (USA): Hydrophobic Adsorption Chromatography and Adsorptive Immobilization of Proteins

J. PORATH (Sweden): Charge Transfer Chromatography in Aqueous Systems

Many of the Invited Lectures will be published in the IUPAC official journal *Pure and Applied Chemistry* and possibly as a Conference Volume simultaneously by Pergamon Press, Oxford.

There will also be sessions on panel discussions and poster sessions. Short communications will not be included in the programme. A limited number of discussion contributions will be presented at the panel discussion sessions by invited and co-opted panel members. Poster sessions will provide an effective and informal discussion of various problems.

Correspondence

The address for further information is as given for 18th Microsymposium (see p. 59).

V INTERNATIONAL SYMPOSIUM ON CAROTENOIDS

Madison, Wisconsin: 23–28 July 1978

The Fifth International Symposium on Carotenoids will be held in Madison, Wisconsin. Provisional reservations of rooms at Wisconsin Center Guest House have been made. No travel arrangements for foreign visitors are being made by the Organizing Committee. The organizers suggest that visitors from Europe consider the possibility of a group flight from London to Chicago and they contact Prof. E. W. GOODWIN at Department of Biochemistry, University of Liverpool, Liverpool L69 3BX, UK. English is the official language of the Symposium; no simultaneous translation facilities will be provided.

Scientific Programme

The scientific programme will include introductory lectures, session lectures and contributed papers. The topics will be divided under three subheadings as given below along with the names of session lecturers who have provisionally agreed to present lectures.

Introductory Speakers

T. W. GOODWIN (UK), O. ISLER (Switzerland), B. C. L. WEEDON (UK)

Session Topics and Lecturers

Isolation, Characterization, Synthesis, Properties and Uses of Carotenoids

H. J. BESTMAN (FRG): Synthesis of Polyenes via Phosphonium–Ylids

C. H. EUGSTER (Switzerland): Characterization, Chemistry and Stereochemistry of Carotenoids

S. LIAAEN-JENSEN (Norway): Carotenoids – A Chemosystematic Approach

- H. MAYER (Switzerland): Synthesis of Optically-active Carotenoids and Related Compounds
 G. P. MOSS (UK): Physical and Physico-Chemical Studies on Carotenoids
 H. PFANDER (Switzerland): Isolation and Synthesis of Glycosylesters and Other Compounds
 M. ROSENBERGER (USA): New Approaches to the Synthesis of Canthaxanthin
 H. THOMMEN (Switzerland): Applications of Carotenoids in Agronomy

Biochemistry, Biology and Genetics of Carotenoids

- E. CERDA-OLMEDO (Spain): Inheritance of Carotenoids
 B. H. DAVIES (UK): Studies on the Biosynthesis of Carotenes with Special Reference to Oxygenated Derivatives and Unique Carotenoids of Micro-organisms and Plants.
 N. I. KRINSKY (USA): Carotenoid Protection Against Oxidation
 J. W. PORTER (USA): Enzymatic Synthesis of Carotenes
 H. C. RILLING (USA): Isolation, Crystallization and Mechanism of Reaction of Polyprenyl Transferases
 H. YAMAMOTO (USA): Interconversion of Oxygenated Carotenoids, and Particularly in Relation to Photosynthesis

Functions of Vitamin A in Normal and Tumor Tissue

- R. K. BOUTWELL (USA): Effects of Vitamin A and Related Compounds on the Biochemical Processes Closely Linked to Tumorigenesis
 L. M. DeLUCA (USA): Biological Functions of Vitamin A and Related Compounds

Introductory and selected session lectures will be published in *Pure and Applied Chemistry*, the official journal of IUPAC and it is anticipated that a separate Symposium volume will be published simultaneously by Pergamon Press, Oxford.

Participants wishing to present a research paper should complete and forward the preliminary application form obtainable from the address given at the end of this announcement. Abstracts of papers should be prepared in accordance with special instructions. A book of abstracts will be available to participants at the time of registration.

Correspondence

Enquiries and correspondence concerning the symposium should be addressed to J. W. PORTER, Department of Physiological Chemistry, 589 Medical Sciences Building, University of Wisconsin Medical School, 1215 Linden Drive, Madison, Wisconsin 53706, USA.

IV INTERNATIONAL SYMPOSIUM ON SOLUTE-SOLUTE-SOLVENT INTERACTIONS

Vienna: 11-15 September 1978

The Fourth International Symposium on Solute-Solute-Solvent Interactions is being organized by Verein Österreichischer Chemiker at Vienna under the

sponsorship of IUPAC. The official language of the Symposium will be English. Although papers may be presented in any language, translation facilities will not be available and it is therefore recommended that papers be presented in English.

Scientific Programme

The main purpose of the Symposium is to bring together scientists from theoretical chemistry, chemical physics, physical chemistry, coordination chemistry, inorganic and organic chemistry who share a common interest in structural and chemical dynamic aspects of solution chemistry and liquid state physics. In order to gain a deeper understanding of the interactions in both aqueous and non-aqueous solutions, the latest results of current research will be presented and extensively discussed.

The following scientists have agreed to present plenary lectures as given hereunder:

- J.-C. JUSTICE (France): Solvation Effects on Guernsey Cosphere Overlaps: a Conductimetric Approach
 F. KOHLER (FRG): Structure of Liquids with Non-Central Interactions
 H. LISCHKA (Austria): Theory of Intermolecular Interactions—A Survey of Results
 U. MAYER (Austria): A Semiempirical Model for the Description of Solvent Effects on Chemical Reactions
 A. H. NARTEN (USA): Diffraction Studies of Ion-Water Interactions
 L. SOBCZYK (Poland): Dielectric Response of Intermolecular Interactions in Liquids
 M. C. R. SYMONS (UK): Spectroscopic Studies of Ionic Solvation
 D. W. WATTS (Australia): Solvents and their Role in Determining Inorganic Mechanisms

Up to 130 contributed papers will be accepted for presentation. Because the anticipated number of offered papers may exceed this number a selection of papers will be made by the Organizing Committee. A time of 15 min will be available for presentation of each paper with additional 5 min for discussion. An abstract in English of about 300 words is requested. The total length of the abstract should not exceed two type-written pages. Instructions for authors can be obtained from the address given at the end of this announcement. Each participant will be provided with one copy of the Abstracts-Volume.

Correspondence

Enquiries and correspondence concerning the Symposium should be addressed to: Prof. K. UTVARY, Verein Österreichischer Chemiker, Eschenbachgasse 9, A-1010 Vienna, Austria.

II INTERNATIONAL SYMPOSIUM ON ORGANIC SYNTHESIS

Jerusalem—Haifa: 11-15 September 1978

The Second IUPAC Symposium on Organic Synthesis will take place in Jerusalem and Haifa (Israel) from 11-15 September 1978. The meeting is being sponsored

by IUPAC and the Israel Chemical Society. The First Symposium in the series was held in Louvain-La-Neuve (Belgium) in August 1974. The meeting will open in Jerusalem on the evening of 10 September and then proceed on the morning of 14 September to Haifa. The language of the conference, written or spoken, will be in English.

Scientific Programme

The Scientific Programme will include Plenary Lectures, short contributed papers and poster displays.

The following scientists have so far accepted invitations to give Plenary lectures:

| | |
|---------------------|----------------------|
| J.E. BALDWIN (USA) | T. MUKAIYAMA (Japan) |
| D.A. EVANS (USA) | C.W. REES (UK) |
| M. LAHAV (Israel) | U. SCHÖLLKOPF (FRG) |
| J.-M. LEHN (France) | K.B. SHARPLESS (USA) |
| A.I. MEYERS (USA) | R.V. STEVENS (USA) |
| | J. TSUJI (Japan) |

Plenary lectures will be published in the official IUPAC journal *Pure and Applied Chemistry* and possibly as a separate Symposium Volume as well by Pergamon Press, Oxford.

Participants wishing to submit a paper may be invited to present a short communication or to display it in the form of a poster, at the discretion of the Organizing Committee.

Correspondence

Enquiries and correspondence concerning the Symposium should be addressed to: Prof. SHALOM SAREL, IUPAC Symposium on Organic Synthesis, PO Box 2160, Jerusalem, Israel.

II INTERNATIONAL SYMPOSIUM ON MARINE NATURAL PRODUCTS

Sorrento, Italy: 12–15 September 1978

The Second International Symposium, sponsored by IUPAC, will be held under the auspices of Società Chimica Italiana at Sorrento. The First Symposium

was held in Aberdeen (Scotland, UK) during 8–11 September 1975. Hotel accommodation may be reserved by application on the registration form available from the address given at the end of this announcement. English will be the official language; no simultaneous translation service will be provided.

Scientific Programme

The symposium will be concerned with the structure, chemistry, biosynthesis, biological and pharmacological significance of metabolites from marine animals, plants and microorganisms. The Programme will comprise: plenary lectures, contributed papers, poster sessions, workshops.

The following persons have accepted invitations to give plenary lectures during the Symposium:

| | |
|-------------------|------------------------|
| H. BARNES (UK) | D.G. MULLER (FRG) |
| C. DJERASSI (USA) | A. PELTER (UK) |
| W. FENICAL (USA) | P. SCHEUER (USA) |
| Y. HIRATA (Japan) | R.J. WELLS (Australia) |

The plenary lectures delivered at the Symposium will be published in *Pure and Applied Chemistry*, the official journal of IUPAC, and it is anticipated that they will also be made available as a separate Symposium Volume by Pergamon Press, Oxford. Shorter contributed papers relating to the themes of the Symposium are invited. Anyone wishing to contribute a paper should submit an abstract to Prof. L. MINALE, Laboratorio per la Chimica di Molecole di Interesse Biologico, via Toiano 2, Arco Felice (NA), Italy. The abstract should not exceed one 20 cm × 27 cm page. Book of Abstracts will be available to the participants at the Symposium. In addition, it is proposed to make arrangements for a contributor's work to be displayed in the form of a poster. The mode of submission though is initially the same, viz. send an abstract as for a contributed paper.

Correspondence

Enquiries and correspondence concerning the Symposium should be addressed to: Dr. G. SODANO, Laboratorio per la Chimica di Molecole di Interesse Biologico, CNR, Via Toiano 2, Arco Felice (NA), Italy.

ON-LINE REVOLUTION IN INFORMATION

International Seminar. Paris: 6-7 July 1978

The International Council of Scientific Unions Abstracting Board (ICSU AB) and the Bureau National d'Information Scientifique et Technique (BNIST) have announced a special seminar to be held in Paris on 'The On-Line Revolution in Information: Implications for the User'. The seminar should be of interest to information officers, librarians, documentalists, scientists, and engineerings – who will all have sooner or later to face the very new technique of On-Line.

Programme

The following experts, from all over the world, have so far agreed to examine the 'for' and 'against' of on-line systems, and the future consequences in the information field.

ANDERLA, Directeur de la Gestion de l'Information, CEC

BARRETT, Director, INFOLINE

DAY, Deputy Director, N.L.M.

DUSOULIER, United Nations Office

ISOTTA, Head of SDS, ESRIN

KENNEDY, Director BIOSIS

MICHEL, Permanent Secretary, BNIST

MOUREAU, Director, IFP Documentation Centre

SMITH, President, ASIDIC

TOMBERG, President, EUSIDIC

The programme will be divided into four half day work:

- What is On-Line? (the benefits and the changes brought by a new technique at the service of the users)
- The On-Line Services available (bibliographic and numerical Data Bases, Library Data Bases)
- Networks: why? How? (Europe, USA, how to access them?)
- The future of On-Line

Near by the Conference Room (English, French simultaneous interpretation available), an exhibit will illustrate the papers with On-Line demonstrations and publication displays.

Correspondence

For further information on the seminar and the exhibit, please contact: ICSU AB Secretariat, 17 rue Mirabeau, 75016 Paris, France. Tel: 527 22-76.

IUPAC PUBLICATIONS 1977

A compilation of IUPAC Publications in 1975–76 was published in *Information Bulletin* Nos. 52/53 (May 1977). The present listing attempts to cover everything issued during 1977.

The IUPAC Secretariat would be pleased to receive notification of any omissions from this listing, especially of translations completed or in process of being prepared of IUPAC nomenclature recommendations.

Pure and Applied Chemistry*

Vol. 49, No. 1: Plenary and Section Lectures from V International Conference on Non-Aqueous Solutions, Leeds (UK), July 1976

IUPAC Chemical Data Series: General Introduction to the Series

Commission on Equilibrium Data: Critical Evaluation of Equilibrium Constants in Solution. Stability Constants of Metal Complexes: Introductory Chapter

Vol. 49, No. 2: Plenary Lectures from International Symposium on Low Molecular Weight Sulphur Containing Natural Products, Jablonna (Poland), July 1976

Commission on Electroanalytical Chemistry: Sulpholane—Purification, Tests for Purity, and Properties

Commission on Electroanalytical Chemistry: Voltammetric Half-Wave Potentials in Sulpholane as Solvent

Vol. 49, No. 3: Plenary Lectures from the VI International Symposium on Photochemistry, Aix-en-Provence (France), July 1976

Commission on Analytical Radiochemistry and Nuclear Materials: Recommended Procedure for Measurement of 14-MeV Neutron Fluxes from Accelerators for Activation Analysis

Vol. 49, No. 4: Invited Lectures from IUPAC Symposium on Photochemical Processes in Polymer Chemistry, Leuven (Belgium), June 1976

Vol. 49, No. 5: Main Lectures from II International Symposium on Polyvinylchloride, Lyon-Villeurbanne (France), July 1976

Commission on Physicochemical Measurements and Standards Subcommittee on Calibration and Test Materials: Recommended Reference Materials for

Realization of Physicochemical Properties. Section: Absorbance and Wavelength
Commission on Pesticide Terminal Residues: Ethylenethiourea

Vol. 49, No. 6: Selected Lectures from III International Meeting on Boron Chemistry, Munich & Ettal (FRG), July 1976

Plenary Lectures from XVII International Conference on Coordination Chemistry, Hamburg (FRG), September 1976

Commission on Electroanalytical Chemistry: Polarographic Half-Wave Potentials of Inorganic Substances in N,N'-Dimethylformamide as Solvent

Commission on Electroanalytical Chemistry: Dimethylformamide—Purification, Tests for Purity and Physical Properties

Commission on Microchemical Techniques and Trace Analysis: Trace Analysis Applicable to Determination of Minor Impurities in Chemicals—II. An Evaluation of Methodology for Analysis of High Purity Mineral Acids

Vol. 49, No. 7: Main Lectures from XVI Microsymposium on Macromolecules (Advances on Scattering Methods), Prague (Czechoslovakia), July 1976

Plenary Lectures from III IUPAC Conference on Physical Organic Chemistry, Montpellier (France), September 1976

Vol. 49, No. 8: Selected Lectures from VIII International Symposium on Carbohydrate Chemistry, Kyoto (Japan), August 1976

Vol. 49, No. 9: Plenary Lectures from X International Symposium on Chemistry of Natural Products, Dunedin (New Zealand), August 1976

Commission on Physicochemical Measurements and Standards Subcommittee on Calibration and Test Materials: Recommended Reference Materials for Realization of Physicochemical Properties—Section: Pressure—Volume—Temperature Relationships.

Vol. 49, No. 10: Plenary Lectures from International Symposium on Analytical Chemistry in the Exploration, Mining and Processing of Materials, Johannesburg (Republic of South Africa), August 1976

Vol. 49, No. 11: Plenary Lectures from International Symposium on Advances in Smoking of Foods, Warsaw (Poland), September 1976

Invited Lectures from III International Symposium on Mycotoxins in Foodstuffs, Paris (France), September 1976

Vol. 49, No. 12: Main Lectures from International Symposium on Techniques for the Retrieval of Chemical Information, London (UK), November 1976

*Official journal of IUPAC and additional publications of the Union are available from Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 0BW, UK.

Information Bulletin*

Nos. 52/53, May 1977

[CHEMRAWN: Chemical Research Applied to World Needs. IUPAC Recommendations on Symbols, Units, Nomenclature and Conventions: Complete List of Current Recommendations (as at the end of 1976)]

No. 54, December 1977

[CHEMRAWN: Chemical Research Applied to World Needs. World Data Referral Centre]

Appendices on Provisional Nomenclature, Symbols, Units and Standards

No. 58, July 1977: Use of Abbreviations in the Chemical Literature (Interdivisional Committee on Nomenclature and Symbols and Commission on Molecular Structure and Spectroscopy)

No. 59, July 1977: Proposed Nomenclature for Transport Phenomena in Electrolytic Systems (Commission on Electrochemistry)

No. 60, July 1977: Electrode Reaction Orders, Transfer Coefficients and Rate Constants – Amplification of Definitions and Recommendations for Publication of Parameters (Commission on Electrochemistry)

No. 61, July 1977: Recommendations for Measurement and Presentation of Biochemical Equilibrium Data (IUPAC-IUB-IUPAB Commission of Biothermodynamics)

No. 62, July 1977: Nomenclature of Organic Chemistry: Section H – Isotopically Modified Compounds (Commission on Nomenclature of Organic Chemistry)

No. 63, July 1977: Recommended Nomenclature for Liquid–Liquid Distribution (Solvent Extraction): Revised 1975 (Commission on Analytical Nomenclature)

No. 64, July 1977: Recommendations for Nomenclature of Thermal Analysis – II. DTA and TG Apparatus and Technique, III. DTA and TG Curves (Commission on Analytical Nomenclature)

No. 65, July 1977: Recommendations on the Nomenclature of Sampling in Applied Chemistry (Commission on Analytical Nomenclature)

No. 66, December 1977: Nomenclature of Phosphorus-containing Compounds of Biochemical Importance (IUPAC-IUB Commission on Biochemical Nomenclature)

No. 67, December 1977: Nomenclature of Lipids (IUPAC-IUB Commission on Biochemical Nomenclature)

No. 68, December 1977: Nomenclature of Multiple Forms of Enzymes (IUPAC-IUB Commission on Biochemical Nomenclature)

No. 69, December 1977: Recommendations for Publication of Papers on Precipitation Methods of Gravimetric Analysis (Commission on Analytical Nomenclature)

*With effect from 1976 *Information Bulletin* is available by subscription from Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 0BW, UK. Back issues of the Bulletin [up to and including Nos. 50/51 (November 1975)] are available from IUPAC Secretariat, Bank Court Chambers, 2–3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK.

Miscellaneous

¹ International Newsletter on Chemical Education (Committee on Teaching of Chemistry. Editor C. N. R. RAO)

No. 6: May 1977

No. 7: December 1977

² Standard Methods for Analysis of Oils, Fats and Soaps: 4th Supplement to 5th Edn. (Commission on Oils, Fats and Derivatives. Prepared for Publication by C. PAQUOT)

*³ International Thermodynamic Tables of the Fluid State (Commission on Thermodynamics and Thermochemistry)

Vol. 3: Carbon Dioxide (Compiled by S. ANGUS, B. ARMSTRONG and K. M. de REUCK)

Vol. 4: Helium (Compiled by S. ANGUS, K. M. de REUCK and R. D. McCARTY)

*⁴ Tables of Wavenumbers for Calibration of Infrared Spectrometers: 2nd Edn. (Commission on Molecular Structure and Spectroscopy. Compiled by A. R. H. COLE)

*⁵ Critical Evaluation of Some Equilibrium Constants involving Alkylammonium Extractants (Commission on Equilibrium Data. Prepared for Publication by A. R. S. KERTES)

*⁶ Critical Survey of Stability Constants of EDTA Complexes (Commission on Equilibrium Data. Prepared for Publication by G. ANDEREGG)

*⁷ Compound Forming Extractants, Solvating Solvents and Inert Solvents (Commission on Equilibrium Data. Prepared for Publication by Y. MARCUS, E. YANIR and A. S. KERTES)

⁸ How to Name an Inorganic Substance – A Guide to the Use of Nomenclature of Inorganic Chemistry: Definitive Rules 1970 (Commission on Nomenclature of Inorganic Chemistry. Prepared for Publication by W. C. FERNELIUS)

⁹ Physical Chemistry: Enriching Topics from Colloid and Surface Science, 2nd Printing (incorporating corrections) (Commission on Colloid and Surface Chemistry. Edited by H. van OLPHEN and K. J. MYSELS)

¹⁰ Nomenclature Chimiei Anorganice – Romanian version of Nomenclature of Inorganic Chemistry: Definitive Rules 1970 (2nd Edn., 1971)

¹¹ A Kémiai Elnevezés és Helyesírás Alapjai – Hungarian adaptation of the most important rules of IUPAC Nomenclature from Nomenclature of Organic Chemistry – Sections A, B & C: Definitive Rules 1969 (3rd Edn., 1971); Nomenclature of Inorganic Chemistry: Definitive Rules 1970 (2nd Edn., 1971); and Manual of Symbols and Termin-

* Published under IUPAC Chemical Data Series

¹ Available from IUPAC Secretariat, Oxford, UK.

^{2–8} Available from Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 0BW, UK.

⁹ Available from Theorex, 8327 La Jolla Scenic Drive, La Jolla, Calif. 92037, USA.

¹⁰ Available from Editura Academiei Republicii Socialiste România, Calea Victoriei nr. 125, Sectorul 1, Bucuresti, Romania

¹¹ Available from Akadémiai Kiadó, Budapest, Hungary.

- ology for Physicochemical Quantities and Units: Definitive Rules 1973 (2nd Edn., 1975)
- ¹² Handbuch der Symbole und der Terminologie physikochemischer Grössen und Einheiten (1973) – German version of Manual of Symbols and Terminology for Physicochemical Quantities and Units (1973 Edn.)
 - ¹³ Regels voor de Nomenclatuur van de Organische Chemie, Sectie C – Dutch version of Nomenclature of Organic Chemistry, Section C (1969)
 - ¹⁴ Muki Kagaku Meineiho – Japanese version of Nomenclature of Inorganic Chemistry: Definitive Rules 1970 (2nd Edn., 1971)
 - ¹⁵ Règles de Nomenclature pour la Chimie Organique, Sections D–E – French version of Nomenclature of Organic Chemistry, Sections D and E
 - ¹⁶ Education and Training for Clinical Chemistry. Edited by M. RUBIN and P. LOUS
-
- ¹² Available from Verlag Chemie GmbH, Postfach 1260/1280, D-6940 Weinheim, Federal Republic of Germany.
 - ¹³ Available from Koninklijke Nederlandse Vereniging, Postbus 90613, Burnierstraat 1, NL-2509 LP Den Haag, Netherlands.
 - ¹⁴ Available from Nankodo Co. Ltd., 42-6 Hongo 3-chome, Bunkyo, Tokyo 113, Japan.
 - ¹⁵ Available from Société Chimique de France, 250 Rue Saint-Jacques, F-75005 Paris, France.
 - ¹⁶ Available from MTP Press Ltd., St. Leonard's House, Lancaster, UK.
- ¹⁷ Proceedings of I International Symposium on Clinical Chemistry and Chemical Toxicology of Metals, Monte Carlo (Monaco), March 1977. Editor S. S. BROWN
 - ¹⁸ Proceedings of VI International Congress on Catalysis (Vols. 1 & 2), London (UK), July 1976. Editors: G. C. BOND, P. B. WELLS and F. C. TOMPKINS
 - ¹⁹ Proceedings of IUPAC-IUPHAR Symposium on Biological Activity and Chemical Structure, Noordwijkerhout (Netherlands), August/September 1977. Editor: J. A. K. BUISMAN
 - ²⁰ Bibliography on High Temperature Chemistry and Physics of Materials:
Vol. 21, No. 1: January – March 1977
Vol. 21, No. 2: April – June 1977
Vol. 21, No. 3: July – September 1977
Vol. 21, No. 4: October – December 1977
 - ²¹ Bulletin of Thermodynamics and Thermochemistry – No. 20, July 1977
-
- ¹⁷ Available from Elsevier/North-Holland Biomedical Press, 335 Jan van Galenstraat, POB 211, Amsterdam, Netherlands
 - ¹⁸ Available from The Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK.
 - ¹⁹ Available from Elsevier Scientific Publishing Co., 335 Jan van Galenstraat, POB 211, Amsterdam, Netherlands.
 - ²⁰ Available from Dr. M. G. HOCKING, Department of Metallurgy, Imperial College of Science and Technology, South Kensington, London SW7 2BP, UK.
 - ²¹ Available from Publications Distribution Service, University of Michigan, 615 East University Avenue, Ann Arbor, Michigan 48106, USA.

REPRODUCTION/TRANSLATION FROM IUPAC PUBLICATIONS

At the meeting of the Committee on Publications in Warsaw (August 1977) the policy of granting permission for reproduction/translation from IUPAC publications was considered with the official publisher, Pergamon Press. The following guidelines were agreed and are given hereunder for general information.

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2. By commercial publishers only on payment to Pergamon of a reproduction fee, with Pergamon to decide if the medium involved is disseminated on a profit-making basis and therefore if a fee is to be levied.
3. For both 1 and 2 requestees must include a full reference to original source of publication in *PAC* and not reproduce sooner than 6 months after publication in *PAC*.

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2. Must include a full reference to original source of publication by IUPAC as the official IUPAC document.

IUPAC COLLEAGUES DECEASED

We have been informed of the death of:

Italy Ing. C. CAROLA (26 December 1977) –
Commission on Oils, Fats, and Derivatives
(1973–)

UK Prof. W. KLYNE (13 November 1977) –
Biological Chemistry Division Committee (1958–

1961, 1963–1967), IUB–IUPAC Commission on
Biochemical Nomenclature (1958–), Commission
on Nomenclature of Organic Chemistry (1971–)

USA Prof. T. F. YOUNG (1 April 1977) –
Commission on Physicochemical Symbols,
Terminology, and Units (1951–1959)

PROVISIONAL

**INTERNATIONAL UNION OF
PURE AND APPLIED CHEMISTRY**

**ANALYTICAL CHEMISTRY DIVISION
COMMISSION ON ANALYTICAL NOMENCLATURE**

**RECOMMENDATIONS FOR PUBLISHING
MANUSCRIPTS ON ION-SELECTIVE
ELECTRODES**

Prepared for Publication by
G. G. GUILBAULT

Comments on these proposals should be sent within 8 months of Publication to the Secretary of the Commission:

Prof. G. G. GUILBAULT
Department of Chemistry
University of New Orleans
Lake Front
New Orleans
Louisiana 70122
USA

Comments in languages other than English are encouraged. These may have special significance regarding the eventual publication in various countries of translations of the nomenclature finally approved by IUPAC.

RECOMMENDATIONS FOR PUBLISHING MANUSCRIPTS ON ION-SELECTIVE ELECTRODES

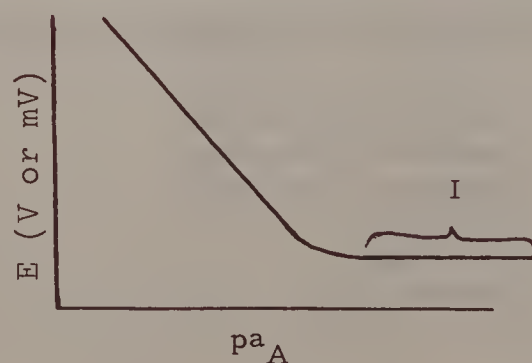
INTRODUCTION

Papers on ion-selective electrodes are concerned with fundamental aspects, developments, appraisal and applications. While it may be difficult to lay down guidelines for publishing manuscripts on fundamental aspects, prospective readers of papers on ion-selective electrode developments, appraisal and applications can more easily reach intelligent decisions on advantages and limitations if attention is given to set specification. Of prime importance is the objective that all papers should aim at consistency in preferred usages. In this respect special attention is directed to the report of The Analytical Nomenclature Commission of the International Union of Pure and Applied Chemistry on "Recommendations for Terms and Symbols in the Field of Ion-Selective Electrodes." The definitions of most frequently used terms taken from this report are given below, and are followed by summaries of the essential points to be included in papers on new electrode developments and applications respectively. This present report was prepared by a committee consisting of G. G. Guilbault (Chairman), R. A. Durst, M. S. Frant, H. Freiser, E. H. Hansen, T. S. Light, G. J. Moody, E. Pungor, G. Rechnitz, N. M. Rice, T. J. Rohm, J. Ruzicka, W. Simon and J. D. R. Thomas. It has been circulated in first, second and third draft forms and was discussed in a joint meeting of IDCNS, Commission I. 3, V. 3, and V. 5 in Warsaw. This final report is the result of proposed modifications made during this meeting, and as a result of comments made by various scientists.

ION-SELECTIVE ELECTRODE NOMENCLATURE AND DEFINITIONS

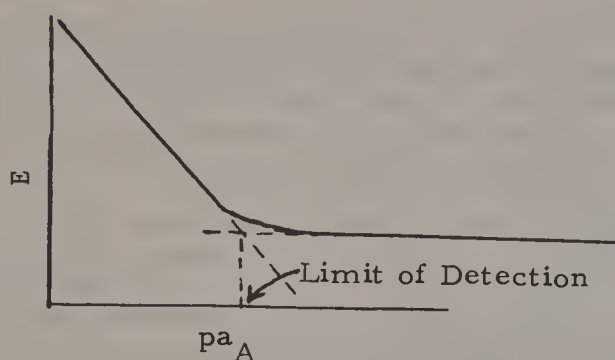
A. DEFINITIONS OF MOST FREQUENTLY USED TERMS

1. Calibration Curve is a plot of the potential (emf) of a given ion-selective electrode cell assembly (ion-selective electrode combined with an identified reference electrode) versus the logarithm of the ionic activity (or concentration) of a given species. For uniformity, it is recommended that the potential be plotted on the ordinate (vertical axis) with the more positive potentials at the top of the graph and that pa_A ($-\log$ activity of the species measured, A) or pc_A plotted on the abscissa (horizontal axis) with increasing activity to the right.
2. Limit of Detection. A calibration curve ordinarily has the following shape.



By analogy with definitions adopted in other fields, the limit of detection should be defined as that concentration for which, under the specified conditions, the potential \bar{E} deviates from the average potential in region I by some arbitrary multiple of the standard error of a single measurement of the potential in region I.

In the present state of the art, and for the sake of practical convenience, a simpler (and more convenient) definition is recommended at this time. The practical limit of detection may be taken as the activity (or concentration) of A at the point of intersection of the extrapolated illustration:



Since many factors affect the detection limit, the experimental conditions used should be reported, i. e. , composition of the solution, the history and preconditioning of the electrode, stirring rate, etc.

3. Drift is the slow non-random change with time in the potential (emf) of an ion-selective electrode cell assembly maintained in a solution of constant composition and temperature.
4. Interfering Substance is any species, other than the ion being measured, whose presence in the sample solution affects the measured emf of a cell.

Interfering Substances fall into two classes: Interferences with the electrode response and those with the analytical procedure. Examples of the first class would be those substances which give a response similar to the ion being measured and whose presence generally results in an apparent increase in the activity (or concentration) of the ion to be determined (e. g. , Na^+ for the Ca^{++} electrode), those species which interact with the membrane so as to change its chemical composition (i. e. , organic solvents for the liquid or polyvinylchloride (PVC) membrane electrodes), or electrolytes present at a high concentration giving rise to appreciable liquid-junction potentials. The second class of interfering substances are those which interact with the ion being measured so as to decrease its activity or apparent concentration, but where the electrode continues to report the true activity (e. g. , CN^- present in the measurement of Ag^+).

5. The modified Nernst Equation for Ion-Selective Electrodes and Definition of $k_{A,B}^{\text{pot}}$.

$$\underline{E} = \text{constant} + \frac{2303 \underline{R} \underline{T}}{\underline{z}_A \underline{F}} \text{Log} [\underline{a}_A + k_{A,B}^{\text{pot}} (\underline{a}_B)^{\underline{z}_A / \underline{z}_B} + k_{A,C}^{\text{pot}} (\underline{a}_C)^{\underline{z}_A / \underline{z}_C}]$$

\underline{E} is the experimentally observed potential of an I. S. E.

\underline{R} is the gas constant (and is equal to $8.31441 \text{ J K}^{-1} \text{ mol}^{-1}$).

\underline{T} is the thermodynamic temperature (in K).

\underline{F} is the Faraday constant (and is equal to $9.6485 \times 10^4 \text{ C mol}^{-1}$).

\underline{a}_A is the activity of the ion, A (for concentrations measured in moles l^{-1} or molality).

\underline{a}_B and \underline{a}_C are the activities of the interfering ions, B or C (for concentrations measured in moles l^{-1} or molality).

$k_{A,B}^{\text{pot}}$ is the potentiometric selectivity coefficient.

\underline{z}_A is an integer with sign and magnitude corresponding to the charge of the principal ion, A.

\underline{z}_B and \underline{z}_C are integers with sign and magnitude corresponding to the charge of an interfering ion, B or C.

The " constant " term includes the standard potential of the indicator electrode, E_{ISE}^0 , the reference electrode potential, E_{Ref} , and the junction potential, E_j (all in millivolts). This equation can only be rigorously derived when $z_A = z_B = z_C$.

6. Nernstian Response. An ion-selective electrode is said to have Nernstian response over a given range of activity (or concentration) for which a plot of the potential of such an electrode in conjunction with a reference electrode vs. the logarithm of the ionic activity of a given species (a_A) is linear with a slope of (approximately) $2303 \frac{RT}{z_A F}$ ($59.16/z_A$ mV at $25^\circ C$).
7. Practical Response Time. The length of time that elapses between the instant at which an ion-selective electrode and a reference electrode are brought into contact with a sample solution (or at which the concentration of the ion of interest in a solution in contact with an ion-selective electrode and a reference electrode is changed) and the first instant when the potential of the cell has reached 90 % of the final value. The experimental conditions used should be stated, i. e., the stirring rate, the composition of solution of which the response time is measured, the composition of the solution to which the electrode was exposed prior to this measurement, the history and preconditioning of the electrode, and the temperature.
8. Potentiometric Selectivity Coefficient, $k_{A,B}^{pot}$ defines the ability of an ion-selective electrode to distinguish between A , B different ions in the same solution. It is not identical to the similar term used in separation processes. The selectivity coefficient should preferably be evaluated by measuring the response of an ion selective electrode in solutions of the primary ion, A , and interfering ion, B (fixed interference method). Alternatively, the separate solution method could be used to calculate the selectivity coefficient. This method is less desirable because it does not approximate as well the conditions under which the electrodes are used. It should only be used when the electrode exhibits a Nernstian response. The activity of the primary ion A and the interference B at which $k_{A,B}^{pot}$ is determined should always be specified since the value of $k_{A,B}^{pot}$ is defined by the modified Nernst equation. The smaller value of $k_{A,B}^{pot}$, the greater the electrode's preference for the principal ion, A .
9. Fixed Interference Method. The emf of a cell comprising an ion-selective electrode and a reference electrode is measured with solutions of constant level of interference, a_B , and varying activity of the primary ion, a_A . The potential values obtained are plotted versus the logarithm of the activity of the primary ion. The intersection of the extrapolation of the linear portions of this curve (i. e., where the two terms under the log sign in the expanded Nernst equation have an equal contribution) will indicate the values of a_A which are to be used to calculate $k_{A,B}^{pot}$ from:

$$k_{A,B}^{pot} = (a_A / a_B)^{z_A / z_B}$$

10. Separate Solution Method. The emf of a cell comprising an ion-selective electrode and a reference electrode is measured with each of two separate solutions, one containing the ion, A , at the activity a_A (but no B), the other containing the ion B , at the same activity $a_B = a_A$ (but no A). If the measured values are E_1 and E_2 , respectively, the value of $k_{A,B}^{pot}$ may be calculated from the following equation if the Nernstian equation holds for the indicator ion:

$$\log k_{A,B}^{pot} = \frac{E_2 - E_1}{2303 \frac{RT}{z_A F}} + (1 - \frac{z_A}{z_B}) \log a_A$$

This method is not recommended except in those cases where the mixed solution method is inconvenient or unfeasible.

B. CLASSIFICATION OF ION-SELECTIVE ELECTRODES

Electrodes should be classified using the system described in Pure and Applied Chem. 48, 127 (1976).

C. PAPERS ON NEW OR MODIFIED ELECTRODES

Such papers should include the following essential information :

- (a) Constructional details, including the membrane and conditions of its preparation, inner filling solution, internal reference electrode and contacts. Pretreatment should be specified as should the cell assembly - including the reference electrode employed. For commercial electrodes it is adequate to quote the manufacturer's name and model designation.
- (b) Calibration range, including slope, detection limit and influence of pH, the latter expressed as a potential/pH diagram for at least two levels of activity of the measured ion.
- (c) Stability, including details of storage conditions and drift and information on its susceptibility to attack by chemical agents such as acids, bases, or complexing agents.
- (d) Static or dynamic response times with specific information on how these are obtained with respect to solution conditions, stirring rate, pretreatment, etc. Any change in response time with electrode age should be noted.
- (e) Interfering substances ought to be classified according to type with selectivity for the primary ion over other counter-ions being computed by the Fixed Interference Method at specified interference levels. The selectivity coefficients should be measured on a newly made electrode and indication given how the coefficients change during electrode lifetime.
- (f) Any limitations of the electrode should be clearly stated along with details of operational lifetimes and rejuvenating treatment (which should be evaluated in terms (b) and (e)).
- (g) Temperature coefficient.

D. PAPERS ON APPLICATIONS FOR DIRECT CONCENTRATION/ACTIVITY MEASUREMENTS

These papers can with advantage refer to papers describing characteristics of the electrode employed and which would fall into category C above. Attention ought also to be given to:

- (a) Details of the cell assembly employed and especially of the reference electrode.
- (b) Interferences and their possible elimination.
- (c) Details of experimental procedure, including ionic-strength adjustment and calibrating standards.
- (d) A comparison of activity/concentration values obtained with those obtained by traditional or alternative established procedures (if they exist) with appropriate statistical tests.
- (e) Recovery tests.
- (f) The electrometer or potentiometer used in the emf measurements, as well as its sensitivity, should be specified by manufacturer and model designation and input impedance.

E. PAPERS ON TITRATION APPLICATIONS

In addition to a mention of papers describing electrode characteristics and attention to items listed in D, special attention must be given to :

- (a) Method used for correct end-point location.
- (b) Possible interferences.
- (c) The possibility of electrode damage during usage.

F. PAPERS ON ON-LINE PROCESS APPLICATIONS AND AUTOMATIC METHODS

Reports on applications to on-line continuous monitoring systems ought to include reference to associated work on electrode characteristics and preliminary experimentation on direct concentration/activity measurement. This, and especially measurements on intermittent samples, will help to characterize possible errors due to the additional parameters of the flowing system. Specific mention should be made of:

- (a) Dynamic response-time behavior of the cell.
- (b) Full details of cell design including the reference electrode and the supplementary addition of reagents.
- (c) Definition of calibration procedure (i. e. , on-line, continuous flow or batch, etc.) and frequency of calibration requirements.

CALENDAR OF IUPAC-SPONSORED MEETINGS

1978

| | | |
|----------------------------|---|-------------------------------|
| February 13-17 | UNESCO International Congress on Laboratory Courses in Chemistry in Universities (Prof. A. R. H. COLE, School of Chemistry, University of Western Australia, Nedlands, Western Australia) | Perth (Australia) |
| March 9-10 | International Symposium on Harmonisation of Collaborative Analytical Studies (Dr. H. EGAN, Laboratory of the Government Chemist, Cornwall House, Stamford Street, London SE1 9NQ, UK) | London (UK) |
| April 10-14 | IX International Symposium on Carbohydrate Chemistry (Prof. W. G. OVEREND, Department of Chemistry, Birkbeck College, Malet Street, London WC1E 7HX, UK) | London (UK) |
| May 31 – June 2 | International Symposium on Ions and Ion Pairs and their Role in Chemical Reactions (Prof. J. SMID, College of Environmental Science and Forestry, Syracuse Campus, Syracuse, New York 13210, USA) | Syracuse, N.Y. (USA) |
| June 5-9 | III International Symposium on Genetics of Industrial Microorganisms (Prof. D. PERLMAN, School of Pharmacy, University of Wisconsin, Madison, Wisconsin 53706, USA) | Madison, Wisconsin (USA) |
| July 10-13 | World Conference on Future Sources of Organic Raw Materials (Chemical Institute of Canada, 906-151 Slater Street, Ottawa, Ontario, Canada K1P 5H3) | Toronto (Canada) |
| July 10-13 | 18th Prague Microsymposium on Macromolecules: Synthetic and Semisynthetic Polymer Catalysts and Affinants (Dr. P. ČEFELÍN, PMM Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, CS-162 06 Praha 616, Czechoslovakia) | Prague (Czechoslovakia) |
| July 17-21 | 6th Discussion Conference on Macromolecules: Chromatography of Polymers and Polymers in Chromatography (Dr. P. ČEFELÍN, PMM Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, CS-162 06 Praha 616, Czechoslovakia) | Prague (Czechoslovakia) |
| July 24-28 | IV International Congress of Pesticide Chemistry (Dr. M. SPINDLER, POB 182, CH-4013, Basle, Switzerland) | Zürich (Switzerland) |
| July 24-28 | VII IUPAC Symposium on Photochemistry (Prof. N. J. TURRO, Department of Chemistry, Columbia University, New York, New York 10027, USA) | Leuven (Belgium) |
| July 24-29 | V International Symposium on Carotenoids (Dr. J. W. PORTER, Department of Physiological Chemistry, University of Wisconsin Medical Center, 1215 Linden Drive, 589 Medical Sciences Building, Madison, Wisconsin 53706, USA) | Madison, Wisconsin (USA) |
| August 7-11 | VI International Conference on Non-Aqueous Solutions (Prof. W. A. E. McBRYDE, Guelph-Waterloo Centre for Graduate Work in Chemistry, Department of Chemistry, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada) | Waterloo (Canada) |
| August 20-26 | International Congress of Photographic Science 1978 (Dr. P. GILMAN, Research Laboratories, Eastman Kodak Company, 1669 Lake Avenue, Rochester, New York 14650, USA) | Rochester, N.Y. (USA) |
| August 28 – September 1 | 8th International Conference on Applications of Mössbauer Effect (Prof. H. SANO, Department of Chemistry, Faculty of Science, Tokyo Metropolitan University, Setagaya-ku, Tokyo 158, Japan) | Kyoto (Japan) |
| September 4-6 | 2nd International Symposium on Scientific Bases for Preparation of Heterogeneous Catalysts (Prof. B. DELMON, Groupe de Physico-Chimie Minérale et de Catalyse, Université Catholique de Louvain, Place Croix du Sud 1, B-1348 Louvain-la-Neuve, Belgium) | Louvain-la-Neuve (Belgium) |
| September 4-6 | International Symposium on Polymer Dispersions (Prof. B. PHILIPP, Institut für Polymerenchemie, Akademie der Wissenschaften der DDR, Kantstrasse 55, 153 Teltow-Seehof, German Democratic Republic) | Dresden (GDR) |

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| September 4–7 | VI International Symposium on Medicinal Chemistry (Trans World Conference Organisers Ltd., 142–144 Oxford Street, Cōwley, Oxford OX4 2DZ, UK) | Brighton (UK) |
| September 4–8 | IV Conference on Physical Organic Chemistry (Dr. J. F. GIBSON, Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK) | York (UK) |
| September 4–8 | XIX International Conference on Coordination Chemistry (Prof. A. A. VLČEK, J. Heyrovský Institute of Physical Chemistry and Electrochemistry, Czechoslovak Academy of Sciences, Vlasská 9, 118 40 Prague 1, Czechoslovakia) | Prague (Czechoslovakia) |
| September 4–9 | 6th International Conference on Raman Spectroscopy (Prof. J. R. DURIG, College of Science and Mathematics, University of South Carolina, Columbia, South Carolina 29208, USA) | Bangalore (India) |
| September 7–10 | II International Symposium on Marine Natural Products (Prof. L. MINALE, Laboratoria per la Chimica di Molecole di Interesse Biologico, Via Toiano 2, Arco Felice, Napoli, Italy) | Sorrento, Naples (Italy) |
| September 11–15 | II IUPAC Conference on Organic Synthesis (Prof. S. SAREL, Department of Pharmaceutical Chemistry, Hebrew University School of Pharmacy, POB 12013, Jerusalem, Israel) | Jerusalem and Haifa (Israel) |
| September 11–15 | IV International Conference on Solute–Solute–Solvent Interactions (Prof. P. SCHUSTER, Institut für Theoretische Chemie und Strahlenchemie der Universität Wien, Währingerstrasse 17, A-1090 Wien, Austria) | Vienna (Austria) |
| September 17–23 | XI International Symposium on Chemistry of Natural Products (Dr. R. VLAHOV, Institute of Organic Chemistry, Bulgarian Academy of Sciences, Sofia 1113, Bulgaria) | Golden Sands/Varna (Bulgaria) |
| September 25–October 2 | International Symposium on Frontiers in Bioorganic Chemistry and Molecular Biology (Prof. Yu. A. OVCHINNIKOV, Skermyakin Institute of Bioorganic Chemistry, USSR Academy of Sciences, U1. Vavilova 32, Moscow 117312, USSR) | Tashkent & Moscow (USSR) |
| October 17–21 | International Symposium on Macromolecular Chemistry (Prof. K. A. ANDRIANOV, Polymer Scientific Council, Academy of Sciences of USSR, Vavilov Street 32, 117312 Moscow, USSR) | Tashkent (USSR) |
| October 29–November 3 | World Conference on Vegetable Food Protein (Dr. A. R. BALDWIN, American Oil Chemists' Society, 508 South Sixth Street, Champaign, Illinois 61820, USA) | Amsterdam (Netherlands) |

1979

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|-----------------------|--|-----------------------------|
| July 2–5 | Vth Conference on Modified Polymers, Their Preparation and Properties (Dr. A. ROMANOV, Slovak Academy of Sciences, Dubravska Cesta, Bratislava, Czechoslovakia) | Bratislava (Czechoslovakia) |
| July 9–12 | 19th Prague Microsymposium on Macromolecules: Mechanisms of Degradation and Stabilization of Hydrocarbon Polymers (Dr. P. CEFELIN, PMM Secretariat, Institute of Macromolecular Chemistry, 1888 Petriny, Prague 6, Czechoslovakia) | Prague (Czechoslovakia) |
| July 16–19 | 20th Prague Microsymposium on Macromolecules: Microcalorimetry of Macromolecules (Dr. P. CEFELIN, PMM Secretariat, Institute of Macromolecular Chemistry, 1888 Petriny, Prague 6, Czechoslovakia) | Prague (Czechoslovakia) |
| August 12–18 | 8th International Mass Spectrometry Conference (Dr. O. H. J. CHRISTIE, Laboratory for Mass Spectrometry, University of Oslo, PB 1048 Blindern, Oslo 3, Norway) | Oslo (Norway) |
| August 20–25 | International Conference on Surface and Colloid Chemistry (Prof. S. FRIBERG, Department of Chemistry, 142 Chemistry Building, University of Missouri – Rolla, Rolla, Missouri 65401, USA) | Stockholm (Sweden) |
| August 27–31 | 27th IUPAC Congress (Dr. J. LARINKARI, Kemian Helsingi Keskusliito, POB 13028, Fabianinkatu 7B, SF-00131 Helsinki 13, Finland) | Helsinki (Finland) |
| August 30–September 1 | 4th International IUPAC Symposium on Mycotoxins and Phycotoxins (Dr. P. KROGH, Department of Pathology, State Research Hospital, Frederik V's Vej 11, DK – 2100 København Ø, Denmark) | Lausanne (Switzerland) |
| September 3–7 | 9th International Conference on Organometallic Chemistry (Prof. P. TIROUFLET, Laboratoire de Polarographie Organique, Faculté des Sciences 'Gabriel', Université de Dijon, 6 Boulevard Gabriel, F-21000 Dijon Cédex, France) | Dijon (France) |

September
17-21

International Symposium on Macromolecules (Prof. R. C. SCHULZ,
Organisch-Chemisches Institut, J.J. Becherweg 18-20, D-6500 Mainz,
Federal Republic of Germany)

Mainz
(FRG)

1980

July
20-27

VI International Fermentation Symposium (Prof. J. E. ZAJIC,
Faculty of Engineering Science, University of Western Ontario,
London, Ontario, Canada N6A 5B9)

London, Ontario
(Canada)

August
17-22

V IUPAC Conference on Physical Organic Chemistry
(Prof. J. F. BUNNETT, Division of Natural Sciences – II,
University of California, Santa Cruz, California 95064, USA)

Santa Cruz,
California
(USA)

CALENDAR OF NON-IUPAC MEETINGS

1978

| | | |
|--------------------|---|----------------------------|
| July 2-7 | 4th International Meeting on NMR Spectroscopy (Dr. J. F. GIBSON, The Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK) | York (UK) |
| July 2-8 | 12th Meeting of Federation of European Biochemical Societies (FEBS) (Secretariat, 12th FEBS Meeting, POB 313, 806 Dresden, German Democratic Republic) | Dresden (DDR) |
| July 10-14 | 7th International Symposium on Continuous Cultivation of Microorganisms (Secretariat of the 7th International Symposium on Continuous Cultivation of Microorganisms, Institute of Microbiology, Czechoslovak Academy of Sciences, Budejovická, 1081, CS-14220 Prague 411 (Horní Krc), Czechoslovakia) | Prague (Czechoslovakia) |
| July 16-21 | 7th International Congress of Pharmacology (Prof. F. LEMBECK, Institute of Pharmacology, Universitätspatz 4, A-8010 Graz, Austria) | Paris (France) |
| July 17-21 | 5th Symposium on Recent Advances in Activation Analysis (Mr. C. H. GILL, Marconi Elliott Avionic Systems Ltd., Neutron Division, Elstree Way, Borehamwood, Herts. WD6 1RX, UK) | Oxford (UK) |
| August 3-12 | 11th General Assembly of IUCr and International Congress of Crystallography (11th ICCr, Institute of Physics, Polish Academy of Science, Al. Lotnikow 32/46, Pawilan 9, Poland) | Warsaw (Poland) |
| August 14-18 | 5 Internationales Symposium uber Siliciumorganische Chemie (Dr. W. FRITSCH, Gesellschaft Deutscher Chemiker, POB 900440, D-6000 Frankfurt/Main 90, Federal Republic of Germany) | Karlsruhe (FRG) |
| September 17-22 | 5th IUFOST International Congress of Food Science and Technology (Prof. E. von SYDOW, Secretary General, Swedish Institute for Food Preservation Research Fack, S-40021 Göteborg, Sweden) | Kyoto (Japan) |
| September 25-29 | 12th International Symposium on Chromatography (Gesellschaft Deutscher Chemiker, POB 900440, D-6000 Frankfurt/Main 90, Federal Republic of Germany) | Baden-Baden (FRG) |
| September 25-30 | 2nd European Conference on Organometallic Chemistry 'Stereochemical Aspects of Organometallic Reactions' (Prof. H. LEHMKUHL, Max-Planck-Institut für Kohlenforschung, POB 011325, D-4330 Mulheim a.d. Ruhr 1, Federal Republic of Germany) | Hameln (FRG) |
| October 4-11 | 7th International Congress on Metallic Corrosion (Associacao Brasileira de Corrosao-ABRACO, Edificio do I.N.T., Av. Venezuela 82/709, 20 000 Rio de Janeiro-RJ, Brazil) | Rio de Janeiro (Brazil) |
| December 18-19 | Symposium No. 13 on Pulsed Nuclear Magnetic Resonance in Solids (Prof. J. A. S. SMITH, Department of Chemistry, Queen Elizabeth College, Campden Hill Road, London W8, UK) | London (UK) |

1979

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|---------------|--|-----------------------------------|
| April 2-6 | VI International Vacuum Metallurgy Conference on Special Melting and Metallurgical Coatings (C. F. ELLIOTT, Teledyne-Allvac, POB 759, Monroe, North Carolina 28110, USA) | San Diego, California (USA) |
| July 8-14 | 11th International Congress of Biochemistry (Dr. W. A. BRIDGER, Department of Biochemistry, University of Alberta, Edmonton, Alberta T6G 2H7, Canada) | Toronto (Canada) |
| July 23-26 | 6th International Symposium on Synthesis in Organic Chemistry (The Chemical Society, Burlington House, London W1V 0BN, UK) | Cambridge (UK) |

LIST OF ABBREVIATIONS

| | |
|----------|--|
| CB | IUB-IUPAB-IUPAC Commission on Biothermodynamics |
| CEE | Communauté Européenne Economique |
| CHEMRAWN | IUPAC Committee on Chemical Research Applied to World Needs |
| CNIC | IUPAC Commission on Nomenclature of Inorganic Chemistry |
| CNOC | IUPAC Commission on Nomenclature of Organic Chemistry |
| CODATA | ICSU Committee on Data for Science and Technology |
| COWAR | ICSU Scientific Committee on Water Research |
| CTC | IUPAC Committee on Teaching of Chemistry |
| CToCCS | IUPAC Commission on Toxicology in Clinical Chemistry |
| DECHEMA | European Federation of Chemical Engineering |
| FAO | UN Food and Agriculture Organization |
| FECS | Federation of European Chemical Societies |
| ICASE | International Council of Associations of Science Education |
| ICSU | International Council of Scientific Unions |
| ICSU AB | ICSU Abstracting Board |
| ICSU CTS | ICSU Committee on Teaching of Science |
| IMSEG | International Mass Spectrometric Evaluation Group |
| ISO | International Organization for Standardization |
| ISO/TC | ISO Technical Committee |
| IUB | International Union of Biochemistry |
| IUBS | International Union of Biological Sciences |
| IUCr | International Union of Crystallography |
| IUFoST | International Union of Food Science and Technology |
| IUNS | International Union of Nutritional Sciences |
| IUPAP | International Union of Pure and Applied Physics |
| IUPHAR | International Union of Pharmacology |
| JCBN | IUB-IUPAC Joint Commission on Biochemical Nomenclature |
| OECD | Organization for Economic Cooperation and Development |
| PAC | <i>Pure and Applied Chemistry</i> , official Journal of IUPAC |
| PNA | Appendix on Provisional Nomenclature, Symbols, Terminology, and Conventions to <i>IUPAC Inf. Bull.</i> |
| Red Book | IUPAC Rules on Nomenclature of Inorganic Chemistry |
| SAC | Society for Analytical Chemistry (UK) |
| SAIC | IUPAC Subcommittee for Assessment of Isotopic Composition |
| SCOR | ICSU Scientific Committee on Oceanic Research |
| UN | United Nations |
| UNESCO | UN Educational, Scientific, and Cultural Organization |
| UNISIST | UNESCO-ICSU Programme on International Science Information System |
| WHO | UN World Health Organization |
| WSPF | IUPAC Macromolecular Division Working Party on Supported Polymer Films |

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1978, No. 2



Pergamon

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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, nongovernmental, nonprofit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

to promote continuing cooperation among the chemists of the member countries;

to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;

to cooperate with other international organizations which deal with topics of a chemical nature;

to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 42 countries, each represented by a national organization, such as an academy of science or research council.

IUPAC INFORMATION BULLETIN

The Bulletin provides a news medium for the various activities of IUPAC, especially of its 60 or so committees. It carries advance information on forthcoming symposia which are to be sponsored by IUPAC together with reports of such meetings which have recently taken place. Coverage is also given to projects in which IUPAC is collaborating with other international organizations.

With effect from 1978 the deliberations of the biennial IUPAC Council meetings will be included in the Bulletin and not be published separately in Comptes Rendus form. Provisional recommendations on nomenclature, symbols, terminology, and conventions, which were issued previously as Appendixes will also be incorporated into the Bulletin for 1978 onwards.

In 1978 three issues of the Bulletin will be published: annual subscription inclusive of postal charges US-\$25.00 (£12.50).

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INTERDIVISIONAL COMMITTEE ON NOMENCLATURE AND SYMBOLS (IDCNS)

The Committee met in Warsaw on 12 and 17 August 1977. It received, reviewed, and recommended for publication by IUPAC nine documents containing definitive recommendations on nomenclature, terminology, and symbols in various specific areas of chemistry:

- (i) Recommendations on the Usage of the Terms 'Equivalent' and 'Normal' (revision of PNA* No. 36).
- (ii) Guide to Trivial Names, Trade Names, and Synonyms for Substances Used in Analytical Chemistry (revision of PNA No. 45).
- (iii) Expression of Results in Quantum Chemistry (revision of PNA No. 49).
- (iv) Recommendations for the Presentation of Infrared Absorption Spectra in Data Collections (revision of PNA No. 50).
- (v) Symbolism and Nomenclature for Mass Spectrometry (revision of PNA No. 51).
- (vi) Recommendations for the Naming of Elements of Atomic Numbers Greater than 100 (revision of PNA No. 55).
- (vii) Definition and Symbolism of Molecular Force Constants (revision of PNA No. 56).
- (viii) Quantities and Units in Clinical Chemistry—Recommendation 1977.
- (ix) List of Quantities in Clinical Chemistry—Recommendation 1977 (viii and ix: revisions of definitive Recommendations 1973 previously published in *Pure Appl. Chem.*, Vol. 37, No. 4, 1974).

These documents were revisions of documents that had previously been issued by IUPAC in provisional form and widely circulated in the international chemical community for comment; several had been revised significantly by the respective originating Commissions partly in response to suggestions arising from discussion by IDCNS. Four other documents were held over for further study, with decisions on recommendations for publication by IUPAC to be reached by mail:

- (i) Proposed Terminology and Symbol for the Transfer of Solutes from One Solvent to Another (revision of PNA No. 34).
- (ii) Reporting Experimental Data Dealing with

Critical Micellization Concentrations (revision of PNA No. 52).

- (iii) Selected Definitions, Terminology, and Symbols for Rheological Properties (revision of PNA No. 57).
- (iv) Recommendations for Publication of Papers on Ion-Selective Electrodes (prepared for publication in provisional form by the Commission on Nomenclature of Analytical Chemistry).

Informal reports were heard and discussed on IUPAC activities in progress, including a proposed systematic 'modular' approach to the naming of organic compounds, a recent reorganization of the joint program of IUPAC with IUB in the field of biochemical nomenclature, and a redefinition proposed by the Commission on Atomic Weights of the term 'atomic weight' (to take into account experimentally detectable variations in the distributions of isotopes, both 'natural' and man-made).

The Committee discussed with concern the problems of making widely available the recommendations of IUPAC and of ensuring feedback from authors and editors of the chemical literature. No specific proposals emerged at this time, but it was understood that IUPAC's publications policy is undergoing intensive re-examination by the Committee on Publications.

The Committee has itself produced one provisional recommendation in collaboration with the Commission on Molecular Structure and Spectroscopy, entitled 'Use of Abbreviations in the Chemical Literature'. It proposes guidelines to control and reduce undesirable proliferation of abbreviations, which are categorized under the headings: 'Recommended' (well established and normally requiring no explanation), 'Acceptable' (useful in a given context but not sufficiently well established to be used without explanation), and 'Not recommended'. Examples are given in the field of molecular spectroscopy. The document has been issued as PNA No. 58 (July 1977) to the *IUPAC Inf. Bull.*, and comments are being widely solicited.

Further details of the Committee's deliberations are presented in the minutes, copies of which are available at the IUPAC Secretariat.

Present: Dr. K. L. LOENING (Chairman), Prof. N. LOZAC'H (Vice-Chairman), Dr. M. A. PAUL (Secretary), Prof. J. CHATT, Dr. R. DYBKAER, Prof. W. C. FERNELIUS, Prof. H. M. N. H. IRVING, Prof. P. KARLSON (IUB), Mr. S. P.

*List of Abbreviations is given on the inside back cover.

KLESNEY, Dr. D. R. LIDE, Jr., Prof. J. RIGAUDY, Dr. W. RING, Prof. O. SAMUELSON, Prof. T. TSURUTA, Prof. D. H. WHIFFEN. Because of conflicts with the scheduling of other

meetings, not all of these members could be present during all of the sessions of IDCNS. Dr. H. EGAN and Dr. J. A. EPSTEIN took part in the discussion of Item on Applied Chemistry.

CHEMRAWN PLANNING COMMITTEE

The Committee held its meeting in Warsaw on 15 August 1977. It approved the minutes of the previous meeting held in Zürich (16 February 1977). The following points from the deliberations in Warsaw need specific mention:

1. The Committee recommended that President SMETS mention the Toronto CHEMRAWN Conference in his opening address to the Tokyo Congress (in September 1977).

2. The Committee agreed that the CHEMRAWN Statement, as approved by Council at Madrid, should be published verbatim in the IUPAC literature [*Editorial Note*: published in IUPAC *Inf. Bull.*, No. 54 (December 1977), pp. 6–10].

3. The Committee endorsed the following statements made by the Chairman to the IUPAC Executive Committee on 7 March 1977:

(a) CHEMRAWN is a statement of purposes and not an organization. Eventually these purposes should become part of all of the divisions of IUPAC, although the overall theme may be more dominant in some areas than in others.

(b) CHEMRAWN-type activities provide the basis for treating chemically based human needs as a system rather than as isolated components. Thus, CHEMRAWN Conferences by their very nature will tend to be interdisciplinary.

(c) Judicious IUPAC sponsorship of CHEMRAWN-type activities will make IUPAC an independent nongovernmental forum for the discussion of critical needs and their solution under conditions that otherwise would be impossible. This should increase the value of IUPAC in the eyes of the public and financially supporting institutions.

(d) The integrity of the IUPAC-CHEMRAWN label should be carefully applied and protected. All activities bearing these names should be approved by the Executive Committee, and co-ordination and help provided by the CHEMRAWN Planning Committee.

4. The Committee discussed possible participation in the UN Conference on Science and Technology for Development, and recommended that the CHEMRAWN Planning Committee respond, if asked, but not seek greater involvement at this time.

5. The Committee discussed the need for appoint-

ment of a Vice-Chairman and Secretary to the Planning Committee and unanimously endorsed the desirability of such appointments. It was recommended that the Planning Committee be expanded. The Chairman was asked to investigate possible additional appointments to the Committee, and to recommend candidates for Vice-Chairman and Secretary for consideration by the Committee.

6. In response to a review by Mr. GLYNN MICHAEL of progress in planning for the Toronto Conference, Prof. EL-AZM endorsed the Organizing Committee's efforts to bring scientists from developing countries to the meeting and expressed appreciation on behalf of the Planning Committee for the excellent progress in organization and programme developed by the Chairman and the Toronto Conference Organizing Committee.

7. The proposed Symposium on 'Future Development of Metal and Mineral Resources in Northern Europe' as a CHEMRAWN symposium at the Helsinki Congress in 1979 was discussed. It was agreed that Drs. BARRETT, ROSSITER and ZAIKOV would discuss with Dr. LARANKARI the feasibility, desirability, and possible format of such a Symposium at the 1979 Congress. It was the general consensus of the Committee that the Organizing Committee for the Helsinki Congress should not be asked to undertake such a programme unless they were enthusiastically in favour, and further, the CHEMRAWN label should be attached providing that the Symposium met certain standards to be delineated by the CHEMRAWN Planning Committee in collaboration with the Organizing Committee.

8. The Committee unanimously recommended that:

(a) The next major CHEMRAWN activity be a Conference on 'Chemistry, Agriculture and World Food Supply' and the Executive Committee be so notified;

(b) The Conference be not part of the Helsinki Meeting but rather be on a scale of, and patterned after, the Toronto Meeting;

(c) It be scheduled after evaluation of the Toronto Meeting—possibly in 1980–81—with very preliminary planning to proceed immediately;

(d) Other major organizations working in the area such as IUFOST be considered as cosponsors;

(e) The Chairman explore with the IUPAC Bureau the possibility that a major portion of an IUPAC Congress be devoted to the project;

(f) Consideration also be given to holding the Conference within a developing country providing needs can be met.

9. The Committee agreed to explore undertaking an activity relating to chemistry and the environment, focussed particularly on the environmental aspects of chemical technology transfer to developing countries. Drs. BARRETT and BEHRENS will investigate current activities, if any, in this area by European chemical engineering societies. IUPAC might be able to develop information and guidelines that could be helpful to developing countries in considering the environmental aspects of new chemical technology to be acquired.

Present: (a) *CHEMRAWN Planning Committee:* Dr. B. W. ROSSITER (Chairman), Dr. ABOU-EL-AZM, Dr. J. W. BARRETT, Dr. H. EGAN, Prof. C. G. OVERBERGER, Prof. G. E. ZAIKOV, Prof. H. ZOLLINGER. (b) *International Company Associates Group (ICAG):* Dr. R. T. FAWCETT, B. F. Goodrich Co. (USA), Dr. J. D. VEKERMANS, Belgian Chemical Co. (Belgium), Dr. A. S. SHOUKRY, El Nasr Chemical Co. (Egypt). (c) *Other Guests:* Mr. T. H. GLYNN MICHAEL (Canada), Dr. H. BORDEN MARSHALL (Canada), Dr. W. SPINDEL (USA), Dr. M. KAMEL (Egypt), Dr. S. NOKRASHY (Egypt), Dr. E. GRZYWA (Poland).

COORDINATING COMMITTEE FOR ANALYTICAL METHODS FOR CEE AND IARC (CCAM)

1. Minutes of Previous Meeting. Minutes of the Liaison Group Meeting held in London on 23 July 1976 [see *IUPAC Inf. Bull.*, No. 54 (December 1977), pp. 60–65] were adopted.

2. 1976 Contract. Prof. TRUHAUT reminded Members that he went to Brussels in May 1975 with Sir Harold THOMPSON, who was then President of IUPAC, in order to explore the opinions of the CEE authorities. A 1976 Contract was drawn up, relating to the six Methods which had needed further study in order to reach a conclusion which was scientifically satisfactory. In April 1976, the CEE increased the contractual grant anticipated for 1976 and asked for 10 Methods to be revised. These were chosen on 13 May 1976 during a meeting in Brussels between Melle DEMINE, representing the European Community, and Prof. PELLERIN, appointed to represent IUPAC.

When the Liaison Group met in London on 26 July 1976 it examined the list of methods and decided to circulate six Methods. The 1976 Contract was divided into two parts at the request of the CEE:

1st part: six Methods to be provided by 31 October 1976

2nd part: 10 Methods to be provided by 31 January 1977

The Contract anticipated sending out the Methods in two languages: French and English.

Because the experimental work of IUPAC experts took longer than expected, three Methods *in one language only* were ready to be sent out on 31 October 1976. Following a meeting between Dr. BARTHELEMY (CEE) and Prof. TRUHAUT it was

agreed that the other Methods should be added to those forming the 2nd part of the Contract.

The circulation of the Methods in the 2nd part was completed in December 1976. After many difficulties in translation and in harmonizing very exactly the English and French texts, this task is now almost completed. This will enable the Methods to be sent out before 30 October 1977, a delay which the present CEE authorities have allowed Prof. TRUHAUT.

3. Future Cooperation between IUPAC and CEE. At present no Contract can be envisaged. Dr. CAIRNS, President of IUPAC, at the request of the Coordinating Committee, had asked the CEE to organize a meeting between the *intergovernmental experts* of the Common Market (CEE) countries and IUPAC experts. Prof. TRUHAUT indicated that the situation is as follows.

No analytical Methods for the control of criteria for purity can be made the subject of a study and consequently of a Contract until these criteria have been established by the relevant Commissions of the CEE. Work in this direction is at present blocked by the entry of new countries into the framework of the Common Market as well as by the consequent restructuring of the various divisions of the CEE which has not yet been completed.

Prof. TRUHAUT has made contact with new authorities in the Direction du Marché Intérieur (Director: Mr. BRAUN and Assistant Director: Dr. SCHLOESSER) who have replaced Mr. RABOT and Mr. BARTHELEMY. He is prepared to say that, as soon as the situation has been clarified, co-operation with IUPAC should in principle take up

its old course and become the object of Contracts similar to those established during the past 10 years.

4. Membership. Prof. TRUHAUT reported that three Members of the Coordinating Committee have reached the end of their term of office—Prof. BELCHER, Dr. EGAN and himself. He expressed his grateful thanks to Prof. BELCHER and Dr. EGAN. The composition of the Coordinating Committee should be as follows:

Chairman: Prof. PELLERIN (1977) (Member 1970), *Secretary:* Dr. EGAN (1977), *Members:* Dr. DODGEN (VI.2) (1977), Dr. HAENNI (VI.1) (1975), Prof. HULANICKI (V.1) (1977), Dr. KOJIMA (VI.2) (1973), Dr. MARCUSE (VI.1) (1971), Dr. SCHULLER (VI.2) (1975), Prof. TANAKA (V) (1977), Dr. BARTOS (1977).

Dr. EGAN recalled that Prof. TRUHAUT was the originator behind the IUPAC/CEE Contracts and, after having in effect founded the Coordinating Committee, he had with never-flagging enthusiasm devoted a great deal of effort to it, which has ensured that his authority is recognized by the scientific experts of the CEE. On behalf of the Coordinating Committee he expressed his grateful thanks and his regret at Prof. TRUHAUT's departure, necessitated by the rules of IUPAC.

Present: Prof. R. TRUHAUT (Chairman), Prof. F. PELLERIN (Secretary), Prof. R. BELCHER, Dr. H. EGAN, Dr. E. O. HAENNI, Dr. K. KOJIMA, Prof. R. MARCUSE, Dr. P. L. SCHULLER. Guest: Prof. A. HULANICKI.

CLINICAL CHEMISTRY SECTION (CCS)

SECTION COMMITTEE

Meeting: 12 and 17 August 1977

1. The minutes of the Section meeting in Madrid, September 1975 (see *Comptes Rendus 28th Conference: Part B*, pp. 130–135) were approved.

2. Report of the President of the Section to Council (see *IUPAC Inf. Bull.* 1978, No. 1, pp. 24–25) was approved.

3. The Section and several of its Commissions are opposed to the creation of a Division of Environmental and Health Chemistry, incorporating the present Section of Clinical Chemistry and other IUPAC bodies. The Section could envisage an alternative, a new Division of Clinical, Medicinal, and Toxicological Chemistry which would encompass IUPAC activities in the fields of clinical chemistry, medicinal chemistry and toxicological chemistry.

4. *Work of the Four Commissions.* The Commission on Quantities and Units works on the definition of fundamental terms, names and definitions of intensive derivations of extensive quantities, and quantities divided by time, such as rates, fluxes, etc. A document 'Optical Spectroscopy' should be provisionally published. The Commission on Teaching of Clinical Chemistry works closely with the IFCC Committee on Education. Several publications have appeared and teaching programmes in developing countries have been organized. The role of clinical chemistry in the medical curriculum and the training of the base level technologist are being investigated. The Commission on Automation has prepared a document 'Characteristics and Attributes of Instruments Intended for use in Clinical Chemistry', which was approved to be processed further. The Commission on Toxicology had arranged an International Symposium on the Clinical Chemistry and Chemical Toxicology of Metals in Monte Carlo, Monaco, 2–5 March 1977 and had published its Proceedings.

5. *Ad Hoc Committee for Nuclear and Radiochemistry.* M. SCHWARTZ was appointed to represent the Section in the *ad hoc* Committee which will present a proposal for establishing a new Commission.

6. A Symposium on Harmonization of Collaborative Analytical Studies, London, March 78, will be arranged in collaboration with the Division of Analytical Chemistry and the Division of Applied Chemistry.

7. *Future Activity.* It was agreed to submit to the Council that the four Commissions of the Section continue their work.

8. *Membership.* The elections in the four commissions were approved by the Section. New Titular Members of the Section elected were: P. M. G. BROUGHTON (Leeds), A. de LEENHEER (Gent), V. V. MENSNIKOV (Moscow), W. C. PURDY (Montreal), M. K. SCHWARTZ (New York) and G. SIEST (Nancy). Coopted Members: E. CONCUSTELL-BAS (Barcelona), M. MICAČ-DEVIC (Zagreb), C. S. SOMMERFELT (Oslo). CERIOTTI, FREI, HOMOLKA, Van KAMPEN, MITCHELL, NIXON and STAMM were re-elected. Officers: *President* M. ROTH, *Vice-President* R. GRÄSBECK, *Secretary* M. SCHWARTZ, all for the period 1977–79 (Election confirmed by a mail ballot).

9. *Cooperation with Other Organizations.* These include IFCC, with which organization the Section wishes to continue the close cooperation. The new representative of IUB on the Section is P. N. CAMPBELL (London). Dr. G. ZBINDEN (Zürich) has been appointed IUPHAR representative to IUPAC Commission on Toxicology. SUNDERMAN is the corresponding representative in IUPHAR of the Commission on Toxicology. Collaboration with WHO takes place at many levels. Common activities occur, e.g. on SI unit implementation. COWS/WASP met with the Secretary of the Section in Oulu, Finland. The Secretary will continue to serve as a link between IUPAC and ICSH.

More detailed minutes have been distributed to Members by the Secretary of the Section.

Present: Prof. P. LOUS (President), Dr. M. ROTH (President-elect), Dr. R. GRÄSBECK (Secretary), Dr. D. B. TONKS (Past-President), Prof. D. H. CURNOW, Dr. R. DYBKAER, Prof. F. W. SUNDERMAN, Jr., Prof. T. P. WHITEHEAD, Dr. R. ZENDER (Titular Members), Prof. J. FREI, Prof. V. MENSNIKOV, Dr. F. L. MITCHELL, Dr. W. PURDY (Coopted Members), A. de LEENHEER, M. K. SCHWARTZ, G. SIEST (National Representatives).

COMMISSION ON AUTOMATION (CACC)

Meeting: 14–16 August 1977

1. *Characteristics and Attributes of Instruments Intended for Automated Analysis.* This document

had been sent out to the Members of the Section of Clinical Chemistry. In general the document was accepted but some suggestions for minor alterations had been submitted. The Section Committee would be asked to approve the submission of the document to the Secretariat for publication immediately.

2. *Future of the Commission* was discussed. The following decisions were made: (i) The Commission should stay for another period of 2 years. If, after that time, progress has been unsatisfactory, the future of the Commission should be reviewed. (ii) The Commission will cease to work on the projects 'Interfacing of Laboratory Instruments with Computers' and 'Practical Guidelines for Development of Mechanized Analytical Instruments' in view of the proposed joint action outlined in items 3 and 4 below.

3. *Nomenclature of Automated Analysis*. The Commission was approached by Commission on Analytical Nomenclature (V.3) to take part in the preparation of a joint publication entitled 'Nomenclature on Automated Analysis'. The Commission welcomed this approach and decided that it should be its main activity over the next 2 years. Time was spent discussing a possible approach to the subject. On the last day of the Commission's meeting, a joint meeting with Commission V.3 led to the following joint decisions: (i) All Members of both Commissions should take part in the preparation of a document entitled 'Nomenclature of Automated Analysis'. (ii) The document should be presented to the Section Committees within 2 years. (iii) A general approach to the subject, prepared by the Commission on Automation, was discussed. Further comments from Commission V.3 will be collected by its Chairman, Dr. ZETTLER, and distributed to the Commission on Automation via the contact person, Prof. HJELM. (iv) Informal meetings (Commission on Automation) to prepare the document could probably be organized in April 1978 (Münich) and October 1978 (Pont-à-Mousson) and a joint meeting of the two Commissions in December 1978 (London). A draft document should be available at the meeting in London. The Commission on Automation received an old document from 1968 on 'Recommended Nomenclature for Automatic Analysis' for consideration and 'Recommendations for Nomenclature of Ion-selective Electrodes' for information from the Commission on Analytical Nomenclature.

4. Members of the Commission will take responsibility for the preparation of the document as follows:

Principle of transport of material—WHITEHEAD

Principle of measurement frequency—HJELM

Principle of specimen splitting—HJELM

Mode of operation—YOUNG

Performance constants—BIERENS de HAAN

Performance variables—BUETTNER

Data acquisition and processing will not be part of the joint document.

5. A joint discussion with Dr. F. L. MITCHELL

(Chairman of the IFCC Expert Panel on Instrumentation) and the Commission on Automation was held on the second day of the meeting. It was evident that the activities in the two Groups had become well coordinated.

Present: Prof. M. HJELM (Acting Chairman), Prof. J. BUETTNER, Prof. T. P. WHITEHEAD (Associate Member).

COMMISSION ON TEACHING (CTeCC)

Meeting: 13–14 August 1977

1. *Minutes of the Previous Meeting*. The minutes of the meeting held in Prague (Czechoslovakia) on 2–3 October 1976 were adopted.

2. *Membership*. Two vacancies in Titular membership were created by completion of terms of office by Prof. D. H. CURNOW and Prof. P. LOUS. Prof. D. H. CURNOW was nominated Titular Member and Chairman for a second term (1977–81). Prof. A. DEFALQUE was nominated Titular Member (1977–81). Dr. C. J. PORTER (Titular Member 1975–79) was nominated to continue as Secretary (1977–79). The following were nominated as Associate Members: Prof. P. LOUS (1977–79), Prof. V. V. MENSNIKOV (1977–81) and Dr. J. A. CORREA (1977–81).

3. *Review of Projects*

(i) A 2nd Draft of a proposal for a prototype 2-year M.Sc. programme in Clinical Chemistry was reviewed in detail. A 3rd draft will be prepared and distributed to the National Representatives, IFCC, for comment. It is hoped that a final version of the document will be ready for submission as an IFCC recommendation in 1978.

(ii) Interaction with the Commission on Teaching of Chemistry has not resulted in a joint project contemplated earlier. Communication will be kept open for possible future cooperative endeavours.

(iii) *Teaching Programmes in Developing Countries:*

(a) Prof. RUBIN reported that the Technicon Corp. had allocated \$4200.00 to the IFCC in support of a proposed training programme in clinical chemistry for Brazil. It is expected that this programme will be launched in October/November 1977 possibly at the M.Sc. level.

(b) Prof. KADER reported that the University of Cairo is establishing an Institute of Clinical Chemistry to teach a M.Sc. course in clinical chemistry for Egypt and surrounding countries. The course will be based on a curriculum prepared by this Commission. Although IUPAC has no commitment or responsibility for the course, Members of the Commission will endeavour to provide assistance where possible, on request.

(c) Activities in South East Asia and the South Pacific will be initiated at the IFCC sponsored regional Congress in Singapore in 1979.

(d) Dr. ROTH is taking part in the organization of courses in clinical chemistry for French speaking Africa sponsored by WHO.

(e) Members of the Commission contributed to a Symposium on Education in Clinical Chemistry at the 1st National Meeting of the Spanish Society of Clinical Chemistry held in Barcelona, October 1976.

(f) Financial support to workshops in Quality Control at the X International Congress of Clinical Chemistry (Mexico City, February/March 1978) was obtained by the IFCC.

(iv) Prof. LOUS has prepared a questionnaire designed to collect information from around the world on the present status of the teaching of Clinical Chemistry in Medical Undergraduate Courses.

(v) Prof. DEFALQUE prepared for discussion an extensive document describing the requirements for the education and training of base-level medical technologists. A condensed version of this valuable document will be prepared for the next meeting.

(vi) Procedures employed in different countries for Certification in Clinical Chemistry are being studied with the objective of bringing uniformity to the meaning of the terms certification, accreditation and licensure. Dr. SCHWARTZ will prepare a questionnaire for collection of data from different countries.

4. Publications. A Monograph 'Education and Training for Clinical Chemistry' edited by M. RUBIN and P. LOUS was published in 1977 by the IFCC. The IUPAC Secretariat had decided not to duplicate this publication. It contains much valuable information for individuals interested in setting up educational programmes in Clinical Chemistry and describes the current status of clinical chemistry in 42 countries. To order copies, see *IFCC Newsletter*, Nos. 16-17, 1977.

5. Next Meeting. It was planned that the Commission would meet at the time of the X Congress of Clinical Chemistry, 26 February-3 March 1978, in Mexico City. Expenses for 1978 activities were established at US-\$3795.00 to bring Titular Members to Mexico and US-\$300.00 for administrative expenses—a total of about US-\$4100.00.

Present: Prof. D. H. CURNOW (Chairman), Dr. C. J. PORTER (Secretary), Prof. P. LOUS, Dr. M. K. SCHWARTZ, Dr. M. ROTH (Titular Members), Prof. A. DEFALQUE, Prof. M. M. ABDEL KADER (Associate Members), Dr. W. PURDY, Prof. G. SIEST (Observers). (Due to the indisposition of Prof. CURNOW, Dr. M. K. SCHWARTZ was appointed Vice-Chairman for the purpose of this meeting).

COMMISSION ON TOXICOLOGY (CToCC)

Meeting: 13-14 August 1977

1. International Symposium on Gas Chromatography—Mass Spectrometry of Drugs, Metabolites and Toxic

Substances in Body Fluids. The Symposium is planned to be held in Brussels (Belgium) during the 2nd and 3rd weeks of June 1980 under the joint sponsorship of IUPAC and the European Society for Toxicology. Prof. M. MERCIER (Belgium) agreed to serve as Chairman, with Prof. A. de LEENHEER (Belgium) and Prof. J. SAVORY (USA) as Vice-Chairmen.

2. International Symposium on Clinical Chemical Indices of Organ-Specific Toxicity to be held in Barcelona (Spain) on 1-6 March 1981 is projected as a cooperative undertaking under the joint sponsorship of IUPAC and the Section on Toxicology of the International Union of Pharmacology (IUPHAR). Dr. S. S. BROWN (UK) agreed to serve as Chairman, assisted by Dr. F. W. SUNDERMAN, Jr. (USA) and Dr. D. S. DAVIES (UK) as Vice-Chairmen, Dr. D. TONKS (Canada) as Treasurer, and Dr. M. MERCIER (Belgium) as Exhibition Manager.

3. Second International Symposium on Clinical Chemistry and Chemical Toxicology of Metals is planned to be held in Monte Carlo (Monaco) on 1-6 March 1983 under the joint sponsorship of IUPAC, the International Federation of Clinical Chemistry (IFCC) and the Association of Clinical Scientists. Prof. F. W. SUNDERMAN, Jr. (USA) agreed to serve as Chairman, assisted by Dr. M. STOEPLER (FRG) and Dr. S. S. BROWN (UK) as Vice-Chairmen, and Dr. D. Tonks (Canada) as Treasurer.

4. Subcommittees. The Commission reviewed and approved the reports of activities of (a) the subcommittee on Plasma Cholinesterases (Dr. S. S. BROWN, Chairman) and (b) the subcommittee on Environmental and Occupational Toxicology of Nickel (Prof. F. W. SUNDERMAN, Jr., Chairman). A decision was made to recommend the creation of a new subcommittee on Standardization of Cadmium Analyses in Biological Materials under the chairmanship of Dr. M. STOEPLER (FRG).

5. Joint Meeting with Commission on Air Quality was held to review areas of common interest, notably in relation to (a) the atmospheric monitoring of occupational exposures to nickel, and (b) the correlation between atmospheric measurements of organophosphorus insecticides and measurements of plasma cholinesterase activities. It was decided that the Commission on Air Quality would join the Commission on Toxicology as Cosponsors of the subcommittee on Environmental and Occupational Toxicology of Nickel.

Present: F. W. SUNDERMAN, Jr. (Chairman), S. S. BROWN (Secretary), M. J. G. MERCIER, D. B. TONKS, M. STOEPLER. P. LOUS (President of Section) attended the meeting for some of the items. *Invited Observers:* G. ZBINDEN (IUPHAR) and R. J. M. RATCLIFFE (TWCO) attended in part.

I. PHYSICAL CHEMISTRY DIVISION

DIVISION COMMITTEE

Meeting: 12 and 17 August 1977

The President's Report to Council (see *IUPAC Inf. Bull.* 1978, No. 1, pp. 12–14) was approved; Dr. D. AMBROSE was appointed Acting Secretary; letters of apology for absence were acknowledged from Prof. R. HAASE and Dr. G. WADDINGTON.

I. Divisional Activities

1. A draft version of the new 'Rules of the Division' were approved and referred to the Bureau for authorization.
2. It was agreed that the Division will continue to be represented on Commissions III.2 and III.3 and that it will maintain liaison with the CQUCC of the Section on Clinical Chemistry.
3. The Division Committee has responded to the request from the International Company Associates Group to examine the 'correlation of chemical and physical structure of heterogeneous catalysts with structure'. A subcommittee of Commission I.6 reported on this at Warsaw.
4. The Division Committee received a report from Prof. WESTRUM on the activities of the following CODATA Task Groups: (i) Data on Chemical Kinetics; (ii) Transport Properties; (iii) Internationalization and Systemization of Thermodynamics Data; (iv) Space and Time Dependent Data; (v) Key Values in Thermodynamics; (vi) Data for Industry. It was agreed to recommend to the Bureau that a IUPAC Observer should attend meetings of the CODATA Task Group on Chemical Kinetics.
5. The Division Committee is concerned about the need for *more effective dissemination of reports and recommendations* to chemists at large. It approved a motion emphasizing the importance of a wider distribution of IUPAC Final Recommendations in other journals after their publication in *PAC*, and also for the ready availability of Final Recommendations in reprint form. The motion was tabled at meetings of the Division Presidents and the Committee on Publications.
6. Notice was taken of the attachment of the IUB–IUPAB–IUPAC Commission on Biothermodynamics to the Physical Chemistry Division.

II. Commission Activities

1. The following changes in the Commission and subcommittee structure were approved.
 - (a) It was recommended to the Bureau that the name of Commission I.2 be changed from 'Thermodynamics and Thermochemistry' to 'Thermodynamics'.
 - (b) Detachment of the subcommittee on 'Plasma Chemistry' from Commission I.2 to report directly to the Division Committee.
 - (c) Establishment of a new subcommittee on 'Symbolism and Terminology in Chemical Kinetics' attached to Commission I.1 (Chairman: Prof. K. L. LAIDLER).
 - (d) Establishment of a new subcommittee on 'The Expression of Uncertainties of Thermodynamic Data' attached to Commission I.2 (Chairman: Dr. G. OLAFSEN).
 - (e) Establishment of a new subcommittee on 'Surface Chemical Physics' attached to Commission I.6 (Chairman: Prof. H. G. HANSEN).
 - (f) Establishment of a new subcommittee on 'Reporting Gas Absorption Data' attached to Commission I.6 (Chairman: Prof. R. HAUL).
2. The Division Committee endorsed the recommendation of Commission I.1 that the *Manual of Symbols and Terminology for Physicochemical Quantities and Units* be revised and reissued.
3. The Division Committee approved the following reports for submission to the Bureau for appropriate action:
 - (a) *Final Recommendations*
 - (i) Expression of Results in Quantum Chemistry (Commission I.1).
 - (ii) Recommendations for the Presentation of Infrared Absorption Spectra in Data Collections. A. Condensed Phases (Commission I.5).
 - (iii) Recommendations and Symbolism for Molecular Force Fields (Commission I.5).
 - (iv) Recommendations for Symbolism and Nomenclature in Mass Spectroscopy (Commission I.5).
 - (v) Reporting Experimental Data Dealing with Critical Micellization Concentrations (c.m.c.'s) of Aqueous Surfactant Systems (Commission I.6).
 - (vi) Selected Definitions, Terminology, Symbols for Rheological Properties (Commission I.6).

Items (v) and (vi) are subject to final review by IDCNS.

(b) *Provisional Recommendations*

- (i) Appendix IV to the Manual of Symbols and Terminology for Physicochemical Quantities and Units—Appendix on Thermodynamic Symbols and Nomenclature (Commission I.2).
- (ii) Recommendations for the Presentation of Raman Spectra in Data Collections (Commission I.5).

4. The Division Committee reaffirmed its wish to have the names and addresses of its subcommittee members included in *Membership Lists of IUPAC Bodies*. It also approved a motion asking that all documents and reports that are sent as a matter of routine to Titular and Associate Members be sent also to those members of its subcommittees who request to receive them.

III. Membership

Five vacancies in Titular Membership were created by the retirement of Prof. FAYARD, Prof. HAASE, Prof. GURVICH, Dr. WADDINGTON and Prof. WESTRUM. In accord with the voting practices prescribed by the new Rules Dr. E. D. BECKER, Prof. E. U. FRANCK, Prof. N. IBL, Prof. R. M. LAFFITTE and Dr. Y. MASHIKO were elected. Prof. SUNNER becomes President and Dr. JONES Past President for 2-year terms (1977–79). Prof. FRANCK was elected Vice-President and President Elect and Dr. D. AMBROSE, Secretary.

An extended version of these minutes is available on application to the Division Secretary.

Present: Dr. R. N. JONES (President), Prof. S. SUNNER (President Elect and Vice-President), Dr. D. AMBROSE, Prof. L. V. GURVICH, Dr. K. J. MYSELS, Prof. N. SHEPPARD, Prof. E. F. WESTRUM, Jr. *Present Part Time:* Dr. E. D. BECKER, Prof. N. IBL, Prof. K. G. WEIL, Prof. D. H. WHIFFEN, Mr. A. L. K. ALJIBURY (Observer).

COMMISSION ON PHYSICOCHEMICAL SYMBOLS, TERMINOLOGY AND UNITS (I.1)

Meeting: 13–16 August 1977

1. *Manual.* Commission was informed that Pergamon's stock of *Manual of Symbols and Terminology for Physical Quantities and Units: 1973 Edn.* (the green book) is running out. It felt a strong need of preparing a cheap reprint which could be easily available for all who should be interested. A number of proposals were made for minor changes.

2. *Intermolecular Forces.* Commission resolved to ask the Division Committee to establish a subcommittee to the Division Committee to cover the field of Intermolecular forces.

3. *Results in Quantum Chemistry.* A final version of the recommendations on expression of results in

quantum chemistry was discussed. It was resolved to pass it to the Division Committee for final approval.

4. Subcommittee on Chemical Kinetics

(a) Commission I.1 should ask permission of the Physical Chemistry Division Committee to set up an *ad hoc* subcommittee to be known as the subcommittee for 'Terminology in Chemical Kinetics'.

(b) That the subcommittee be asked to survey the needs of all areas of chemical kinetics including relaxation rates in respect of clear nomenclature, definitions, and symbols for physical quantities.

(c) That the following be invited to be members:

Prof. K. J. LAIDLER, Department of Chemistry, Ottawa University, Ottawa, Canada (Chairman).

Prof. K. H. HOMANN, Department of Chemistry, The University, Darmstadt, FRG.
Mrs. Dr. I. P. SKIBIDA, Institute of Chemical Physics, Academy of Sciences, Moscow, USSR.

Dr. T. M. SUGDEN, Trinity Hall, Cambridge, UK.

5. *Membership.* Dr. LIDE was elected as Chairman for the 1977–81 period. Dr. KALLAY was nominated as a Titular Member (1977–81), Prof. KELLÖ was re-nominated as an Associate Member (1977–81), Prof. WHIFFEN was nominated as an Associate Member (1977–81).

Present: Prof. D. H. WHIFFEN, Dr. ANSARA, Dr. KALLAY (Observer), Prof. KELLÖ, Prof. KOEFOED, Dr. LIDE, Prof. PEREZ MASIÁ, Dr. PAUL, Dr. SCHRUIJFF, Prof. WEIL.

COMMISSION ON THERMODYNAMICS (I.2)

Meeting: 13–16 August 1977

1. *Minutes of Previous Meeting.* The minutes of the meeting held in Madrid were approved.

2. *Symbols, Units, Nomenclature.* The Commission approved Appendix IV of 'Manual of Symbols and Terminology for Physicochemical Quantities and Units', already ratified by Commissions I.1 and I.2.

3. *Plasma Chemistry.* The Commission authorized subcommittee on Plasma Chemistry to hold three meetings in 1979: the Fourth International Plasma Chemistry Symposium in Zürich, Switzerland; a Round Table Conference on Interactions of Plasmas, in Switzerland; and a Round Table Conference on Transport Phenomena in Plasmas, in Edinburgh, UK. It assisted IUPAC approval for publication of two endeavours and approved a membership of Plasma subcommittee (Commission or Committee) (see *Membership Lists of IUPAC Bodies: 1977–1979*)*. Finally it approved the transfer of subcommittee to Division.

*Published for IUPAC by Pergamon Press (1978).

4. Data Publications in Chemical Thermodynamics

(i) Apart from publications under progress, Prof. FRANZOSINI submitted proposals for compilation and editing of a new book 'Salts with Organic Anion or Cation'. This project was approved and become a Commission endeavour, under the leadership of FRANZOSINI.

(ii) The Commission also approved the production of a book on 'Correlation and Critical Evaluation of Thermodynamic Data' under the leadership of G. ARMSTRONG.

(iii) The Commission established a subcommittee on 'Expression of Uncertainties of Experimental Thermodynamic Data', under the Chairmanship of Dr. G. OLOFSSON.

5. *International Conferences on Chemical Thermodynamics*. Every 2 years the Commission sets up a Conference and chooses the 'Rossini Lecturer', a prerogative of the Commission. About the organization of these Conferences, it was reported that some problems arose with countries whose delegates are not known prior to the Conference or are changed at the very last minute: such difficulties must be avoided in the future. The Sixth Conference will be held in Australia in August 1979 or alternatively, if acceptable fares are not available, in Merseburg German Democratic Republic, in 1980.

6. *Subcommittee on Thermodynamic Tables*. A new membership, proposed by its Chairman was approved.

7. *Budget*. Budgets for the Commission and the two subcommittees were discussed and proposed to the Division. The problem of the Thermodynamics Tables Project Centre (at Imperial College, London) was also discussed—difficulties in finding funds might bring about changes in its mode of operation.

8. *Change in Name of Commission*. It was unanimously agreed to change the name to 'Commission on Thermodynamics', following the proposal of M. LAFFITTE.

9. *Membership*. The new membership was approved (see *Membership Lists of IUPAC Bodies: 1977–1979*) with Prof. G. M. SCHNEIDER as the Secretary and Prof. M. LAFFITTE as the Chairman.

Note: A more detailed report will be sent upon request to Prof. M. LAFFITTE.

Present: Prof. E. WESTRUM, Jr. (Chairman), Prof. M. LAFFITTE (Secretary), Dr. J. D. COX, Prof. L. V. GURVICH, Prof. Y. TAKAHASHI, Dr. I. WADSÖ (Titular Members), Dr. S. ANGUS, Prof. M. DIAZ-PENA, Prof. P. FRANZOSINI, Prof. F. KOHLER, Prof. W. ZIELENKIEWICZ (Associate Members), Prof. M. RÄTZSCH (GDR National Representative). Dr. G. ARMSTRONG, Dr. R. M. CLAY, Dr. G. OLAFSSON and Dr. G. GRITZNER attended as Observers.

Subcommittee on Thermodynamic Tables

Meeting: 14 August 1977

1. *Minutes of Previous Meeting*. The minutes of the

meeting of 4 September 1975 held in Madrid, as modified in September 1976, were adopted.

2. *Membership*. Prof. J. KESTIN (USA) has been appointed to the subcommittee. Profs. BAEHR (FRG) and ROWLINSON (UK) have resigned, and Prof. SYTCHEV (USSR) has been unable to attend meetings. Prof. F. KOHLER (FRG), Dr. A. KOZLOV (USSR), and Dr. S. MALANOWSKI (Poland) were nominated to replace them. Drs. ANGUS (UK), COX (UK), KEHIAIAN (France), KESTIN (USA), and WHITE (USA) were re-nominated with Dr. COX to continue as Chairman and Dr. WHITE as Secretary.

3. Work Programme

(a) *Thermodynamic Tables Project*. (i) Books published: Carbon Dioxide, 1976; Helium 4, 1977. (ii) Book in press: Methane. (iii) Tables in process: Nitrogen, near completion; Propylene, Fluorine, Chlorine, Ammonia. (iv) Tables under consideration: Halogenated Hydrocarbons.

(b) *Preparation of a Guide to the Correlation of Thermodynamic Data*. A text has been prepared and widely circulated. A second draft is being typed.

(c) *Development of a Programme on Transport Properties*. The task of developing a unified treatment for thermodynamic and transport properties for simple fluids is under consideration. Prof. KESTIN has been asked to consider this task and, if possible, develop a proposal for specific action.

(d) *Coordination with other Data Programmes*. The subcommittee has developed close interaction with the International Association for the Properties of Steam, the International Data Series, and CODATA. Members of the subcommittee are active in each of these organizations.

(e) *Future Status of Thermodynamic Tables Project Centre*. The subcommittee placed the following proposal before Commission I.2:

The Science Research Council of the United Kingdom has indicated its intention to cease funding the Centre after 1979. The subcommittee on Thermodynamic Tables has considered the future of the Centre and offers the following proposal to Commission I.2 and asks for its endorsement.

It is proposed that the Centre should continue preferably as an IUPAC activity. It is proposed that alternate sources of funding be sought in the United Kingdom, other countries, and from international organizations. It should be understood that obligations to other funding sources might bring about changes in the Centre's mode of operation. The subcommittee would bring any changes of a substantive nature to the attention of the Chairman of Commission I.2.

(f) *Next Meeting*. The subcommittee feels that a meeting in 1978 is of great importance in view of the difficulties being faced by the Project Centre. The Commission was requested to include travel funds for such a meeting in its budget. The time and place for a meeting in 1978 have not been set.

Present: J. D. COX (Chairman), H. J. WHITE, Jr. (Secretary), S. ANGUS (Member), and S. MALANOWSKI (Observer).

COMMISSION ON ELECTROCHEMISTRY (I.3)

Meeting: 13–16 August 1977

1. Reports and Discussion

(a) *Mass Transport*. The report (IBL), presented as a 'provisional document', was further discussed. Minor additions and changes were decided. If no major comments are received within the next 7 months, Prof. IBL will write the final version and circulate it among the Members of the Commission in order to allow publication before the next meeting of the Commission.

(b) *Electrode Reaction Order*. The report (PARSONS) as a 'provisional document' was similarly discussed and the same further procedure adopted.

(c) *Adsorption*. The Commission discussed the report of SANFELD. It will be revised in order to coordinate it better with the already existing IUPAC documents in related fields. Since Prof. SANFELD is not re-eligible this work will be done by two other Members of the Commission; Dr. PARSONS has already accepted; Prof. TRASATTI will be approached by Dr. PARSONS.

(d) *Conductance Data Compilation*. Dr. JUSTICE presented a written report which was discussed. The various ways of making this compilation accessible to the scientific community was considered: publication of extracts in booklets or in journals, supply of specific information upon direct request after the publication of a note drawing the attention to this service.

(e) *Electrode Kinetics*. Dr. NIKI reported on the compilation of data by him in collaboration with Dr. TAMAMUSHI. It is planned to publish the new data available for the last 4–5 years as a supplement to the previous publication on kinetic parameters. The data on gas-evolving electrodes will be included. Dr. NIKI also reported on his current activity concerning on-line acquisition, processing a retrieval of kinetic parameters of electrode reactions.

(f) Dr. PARSONS reported on the revision planned by Commission I.1 for *Manual of Symbols and Terminology for Physicochemical Quantities and Units* and on the suggestions for changes which have already been made on behalf of our Commission. Further amendments proposed during the discussion will be communicated by Prof. IBL to I.1.

2. Future Activities

(a) A compilation of critical selected electrode potentials (revision and extension of Latimer tables) will be undertaken. Profs. PARSONS and BARD are in charge of the project which will be carried out in collaboration with Commission V.5 (Prof. JORDAN).

(b) A short report on the 'Requirements for Calibrating Electrochemical Reactions' (to test methods for the study of electrode kinetics) will be prepared by Prof. NIKI.

(c) Prof. BARD will prepare a draft for a nomenclature report on 'Semiconductor Electrodes'.

(d) Dr. GRITZNER and Prof. KUTA will work out a draft for 'Recommendations Regarding the Selection of Reference Redox Systems in Non-aqueous Solutions'.

(e) Prof. IBL will make a feasibility report on 'Activities in the Field of Electrochemical Engineering', such as compilation of data on diffusion coefficients and transport properties; nomenclature on electrochemical engineering and industrial cells; evaluation tests for technical electrodes for selected reactions; elaboration of factors allowing the economic evaluation of electrochemical processes (similar for instance to the Lang factors used in chemical engineering).

(f) A report on 'Recommendations for Presentation of Papers on Conductance, Transport Numbers and Diffusion Coefficients' will be prepared by Dr. JUSTICE.

(g) Prof. TRASATTI will be asked to report on the feasibility of a document on absolute electrode potentials.

3. Joint Meetings

Three joint meetings were held with Commissions I.6, V.5 and V.3. The Commissions informed each other about their future activities:

(a) A collaboration is planned with I.6 for the part of their project on the chemical physics of surfaces which is relevant for electrochemistry.

(b) Commission V.5 will participate in our project on critical potential. Prof. JORDAN will join our working group.

(c) In the joint meeting the report of the Commission V.5 on 'Recommended Terms, Symbols and Definitions for Electroanalytical Chemistry' was discussed at some length.

(d) An agreement was reached on the way of placing the reference electrode in the scheme of a cell.

(e) The draft of Commission I.4 on the various pH scales commonly referred to as USA, UK, France etc. . . . (DURST, COVINGTON) was discussed. The proposal to switch from a pH scale with multi-primary standards to one with only a single primary standard was accepted.

(f) In a joint meeting with V.5 and V.3, suggestions for minor changes in the report of V.3 on 'Ion-Selective Electrodes' were made.

(g) It was decided with V.5 that a joint subcommittee meeting should again take place in 1978 to discuss in detail the various activities of common interest for the two Commissions.

4. Miscellaneous

(a) The bylaws of the Division of Physical Chemistry were unanimously approved.

(b) The Commission decided to have a meeting in Budapest in September 1978 and a joint-meeting with V.5.

5. Membership

Dr. NIKI (Japan) was nominated as a Titular Member in place of Prof. SANFELD who had retired. The nomination of the following National

Representatives has been approved by the Commission: Prof. J. W. TOMLINSON (New Zealand), Prof. S. MINC (Poland), Prof. KARSULIN (Yugoslavia).

Prof. IBL (Chairman of the Commission) will express to Prof. SANFELD (retiring as Titular Member) the thanks of the Commission for his valuable work in the Commission.

Present: Prof. IBL (Chairman), Dr. PARSONS (Vice-Chairman), Dr. JUSTICE (Secretary), Prof. HEUSLER, Prof. KUTA and Prof. BARD (Titular Members), Dr. DURST and Dr. NIKI (Associate Members), Prof. MINC (National Representative of Poland), Dr. GRITZNER and Dr. PETHYBRIDGE (Observers), Prof. TRASATTI and SANFELD were excused.

COMMISSION ON PHYSICOCHEMICAL MEASUREMENTS AND STANDARDS (I.4)

Meeting: 13–15 August 1977

1. The following were elected or re-elected as Titular Members: Dr. E. BRUNNER, Mr. J. P. CALI, Dr. J. E. LANE and Dr. S. SAËKI; and as Associate Members: Prof. H. KIENITZ, Dr. R. SABBAAH and Dr. W. TRABCZYNSKI. Prof. H. KIENITZ, Dr. D. AMBROSE, Prof. L. CROVINI and Prof. G. MILAZZO were appointed members of the subcommittee on Calibration and Test Materials. Thanks were expressed to retiring members, in particular, to Dr. E. F. G. HERINGTON who had acted as editor of the subcommittee's Recommendations.

2. The terms of reference of the Commission, adopted in 1953, were revised and confirmed as follows: The Commission on Physicochemical Measurements and Standards strives to promote and encourage (a) the improvement and standardization of methods of measurement of physicochemical properties, (b) the use of reference materials for calibrating and checking in physicochemical measurements, and (c) collaboration and accord between various national and international organizations whose objectives are as defined by (a) and (b) above.

3. The name of the Commission was considered with particular reference to the word 'standards', and no recommendation for change was made. In making this decision the meeting took 'standards' to include methods, reference materials, and the pertinent data.

4. The Commission will itself take over completion of the initial programme of the subcommittee on Calibration and Test Materials. Of this programme to make recommendations of reference materials for 17 different physicochemical measurements, eight have been published or are in proof, seven have either been approved for publication or are in an advanced stage of preparation, and only two still require extensive work. One of these is temperature,

and the subcommittee will continue with a smaller membership to deal with this subject only.

5. The Commission will initiate a programme of recommendations on methods of physicochemical measurements with particular reference to the physical principles involved, the sources of error, and the levels of accuracy attainable with different methods.

6. Copies of 'Physicochemical Measurements: Catalogue of Reference Materials from National Laboratories (Revised 1976)' had been distributed throughout IUPAC by the Secretariat to those who might be interested.

7. Dr. GIRARD presented a report on work being done throughout the world in various national laboratories on the density of water.

8. Dr. SAËKI presented a paper by Dr. MASHIKO and himself on 'Precision and accuracy of physicochemical measurements and the role of standard reference substances'. Mr. CALI, Dr. GRAHAM and Dr. MARSH were asked to assist Dr. SAËKI in developing this for publication. Mr. URIANO undertook to make an annotated bibliography of references relating to precision and accuracy in physicochemical measurements. Dr. LANE presented a paper on 'The measurement of physicochemical properties: calibration of instruments and errors'. Consideration of this for publication was deferred.

9. Dr. GRAHAM had sent a report on the activities of the Committee on Standardization of the International Confederation for Thermal Analysis (ICTA).

10. Liaison with Working Group SC 66 D of the International Electrotechnical Commission (IEC) has been maintained and liaison with the Organization de Métrologie Légale (OIML) has been initiated since the Madrid meeting, Dr. JUHASZ being the Commission representative with both organizations. He reported that they agreed that OIML and IEC papers on pH and electrolytic conductivity would comply with the recommendations of this Commission.

Subcommittee on Calibration and Test Materials

All members present at the Commission meeting also attended the meetings of the subcommittee, of which Prof. KIENITZ was Chairman.

(i) The subcommittee had met in Rome in September 1976.

(ii) Recommendations of reference materials for the following measurements, approved by the subcommittee, are in the hands of the editor or in proof: pressure–volume–temperature relationships, potentiometric ion activities, reflectance, permittivity, electrolytic conductivity.

(iii) Revised versions of the chapters on viscosity and relative humidity were approved for publication.

(iv) A final draft of the chapter on thermal conductivity of fluids is awaited.

(v) Dr. BRUNNER, Dr. HERINGTON and Mr. NEWTON had met in January to discuss the chapter on testing distillation columns. A final version is awaited.

(vi) Prof. G. C. KENNEDY (University of California) and Dr. P. L. M. HEYDEMANN (MBS) have agreed to advise Dr. BRUNNER about the projected chapter on pressure measurements, which will be concerned with the range above 1 GPa.

(vii) Dr. AMBROSE had written a paper on reference materials for temperature measurement. Views on what is needed vary considerably, and it is hoped that a meeting next year with the thermometric experts of CIPM will clarify the position.

(viii) The subcommittee has made recommendations of reference materials on the basis of existing knowledge but believes that the recommendations do not cover all the conditions, especially in the ranges of temperature and pressure, in which they are needed. It was therefore decided to examine the following properties with particular reference to the selection of suitable additional materials and any measurements that are required so that all conditions of importance are covered: liquid density and compressibility, pressure-volume-temperature relationships, enthalpies of combustion, thermal conductivity, and viscosity. Particular attention will be given to industrial needs, and an attempt will be made to determine industrial priorities for the provision of reference materials.

Present: Dr. D. AMBROSE (Chairman), Dr. E. BRUNNER (Vice-Chairman and Secretary); Prof. H. FEUERBERG, Dr. J. E. LANE, Prof. G. MILAZZO, Prof. T. PLEBANSKI (Titular Members), Prof. H. KIENITZ, Dr. K. N. MARSH, Dr. S. SAËKI, Dr. O. SUSCHNY (Associate Members), Dr. G. GIRARD, Mr. G. URIANO, Dr. W. TRABCZYNSKI (Observers).

COMMISSION ON MOLECULAR STRUCTURE AND SPECTROSCOPY (I.5)

Meeting: 13–16 August 1977

1. The following three documents were approved for final publication and forwarded to the Physical Chemistry Division. These documents were previously published as provisional recommendations and have undergone the 8-month waiting period. Each was revised according to the comments received.

(i) 'Recommendations for Presentation of Infrared Absorption Spectra in Data Collections. A. Condensed Phases.' This has been published provisionally in September 1976 as PNA No. 50 to *IUPAC Inf. Bull.*

(ii) 'Recommendations for Symbolism and Nomenclature for Mass Spectroscopy.' This has been published provisionally in September 1976 as PNA No. 51 to *IUPAC Inf. Bull.*

(iii) 'Recommendations for Definition and Symbolism of Molecular Force Field.' This has been published provisionally in December 1976 as PNA No. 56 to *IUPAC Inf. Bull.*

2. The second edition of *Tables of Wavenumbers for the Calibration of Infrared Spectrometers* edited by Prof. A. R. H. COLE and published for IUPAC by Pergamon Press has now appeared and is on sale. This book is a milestone in the development of standardization of infrared spectrometers of the modern age. The previous edition was the IUPAC best-selling book.

3. One document on 'Provisional Recommendations for the Presentation of Raman Spectral Data' was approved for provisional publication and forwarded to the Physical Chemistry Division.

4. Other business included the following matters:

(i) *Recommendations for Definitions and Symbols in Circular Dichroism and Optical Rotatory Dispersion.* A document for future consideration by the Commission is being prepared by the subcommittee I.5.4 on Circular Dichroism and Optical Rotatory Dispersion. Several experts throughout the world are very actively collaborating on this project.

(ii) *Definitions and Symbolism in Raman Spectroscopy.* The subcommittee I.5.1 on Infrared and Raman Spectroscopy will explore the need of possible IUPAC Recommendations in this field and will eventually prepare a document for further consideration by the Commission.

(iii) *Choice of Molecular Axes.* It has been pointed out that confusion seems to arise with criteria for choosing molecular axes in various branches of molecular structural studies including spectroscopy. The need for a possible document by IUPAC will be explored.

(iv) *Symbolism and Terminology in Electron Paramagnetic Resonance.* A request was made by specialists in this field that IUPAC Commission I.5 consider this problem on future work. It is agreed to look into this field provided that links are made with IUPAC through the triple Commission, since the field involves problems of chemistry and physics.

(v) *Nomenclature in Molecular Spectroscopy.* A document was presented for discussion on the problems of nomenclature connected with new developments of molecular spectroscopy, especially in relation to various types of electron spectroscopy. This subject will be studied further and a document prepared for possible future actions by the Commission.

5. A joint meeting of Commissions I.5, V.4 and the Commission on Quantity and Units in Clinical Chemistry (CQUCC) was held. A document previously prepared by CQUCC was discussed and possible modifications were referred to an *ad hoc* committee who will meet shortly.

6. *Dissemination of Final Recommendations by IUPAC.* The Commission thinks it necessary that immediate action be taken by the proper IUPAC bodies in order that the Final Recommendations published in *Pure and Applied Chemistry* can reach the largest number of scientists throughout the world.

7. A joint meeting with Commission I.6 was held

to discuss the programme on chemical physics of surfaces that is being initiated by Commission I.6. Commission I.5 will provide advice on matters of electron spectroscopy.

8. *Membership.* The composition of the Commission was considered and the following recommendations were made:

(i) Titular Member: C. N. R. RAO was nominated. The terms of E. D. BECKER (Chairman), G. ZERBI (Secretary) and J. H. BEYNON were extended to 1979.

(ii) Associate Members: S. LEACH, P. RENTZEPIS, J. R. DURIG and J. G. GRASSELLI were nominated. The term of B. JEZOWSKA-TRZEBIATOWSKA was extended to 1979.

(iii) Subcommittee I.5.1 (Infrared and Raman Spectroscopy): no changes.

(iv) Subcommittee I.5.2 (Storage and Retrieval of Spectroscopic Data): no changes.

(v) Subcommittee I.5.3 (Mass Spectroscopy): M. TSUCHIYA was nominated.

(vi) Subcommittee I.5.4 (Optical Rotatory Dispersion and Circular Dichroism): no changes.

Present: Titular Members: E. D. BECKER (Chairman), G. ZERBI (Secretary), V. A. KOPTYUG, C. SANDORFY, D. W. TURNER, Associate Members: B. JEZOWSKA-TRZEBIATOWSKA, C. N. R. RAO, H. A. WILLIS, Subcommittee Members: J. R. DURIG, A. R. H. COLE, C. J. H. SCHUTTE, R. N. JONES, D. R. LIDE, G. SNATZKE, Observers: N. SHEPPARD (Division Committee Member), A. MATHIAS (UK), R. M. GAVIN (USA), W. C. HARRIS (USA), A. L. ALJIBURY (Iraq).

COMMISSION ON COLLOID AND SURFACE CHEMISTRY (I.6)

Meeting: 13–16 August 1977

1. *Zeolites.* Modified version by BARRER of 'Chemical Nomenclature, and Formulation of Compositions, of Synthetic and Natural Zeolites' and published as PNA No. 49 (January 1975) was discussed with Prof. CHATT (Commission on Nomenclature of Inorganic Chemistry). Except for a few minor points, to be discussed with BARRER, the document was recommended for publication, subject to approval by the Division.

2. *CMC.* Proposal 'Reporting Experimental Data dealing with Critical Micellization Concentrations (c.m.c.'s) of aqueous surfactant systems prepared by MYSELS and MUKERJEE and published as PNA No. 52 (September 1976) was revised, the revised version approved by the Division, and is now under consideration by IDCNS.

3. *Rheology.* Proposal prepared by VAN OLPHEN on 'Selected Definitions, Terminology and Symbols for Rheological Properties' and published as PNA No. 57 (December 1976) was revised, and discussed with Macromolecular Division and Commission I.1.

The proposal was approved by the Division but held up for consideration by IDCNS. The document will become Section I.13 of the 'Manual of Symbols and Terminology for Physicochemical Quantities and Units. Appendix II: Definitions, Terminology and Symbols in Colloid and Surface Chemistry.' [*Pure Appl. Chem.* 31 (1972), 579].

4. *New and Current Projects:* (i) *Surface Chemical Physics* by a task force under HANSEN. Emphasis on surface spectroscopy and surface structure. Planning discussed with Commissions I.3 and I.5. (ii) *Light Scattering.* First draft by KERKER and KRATOHVIL. (iii) *Film Balance Data.* First draft by L. TER-MINASSIAN-SARAGA. (iv) *Adsorption from Solution.* Revised draft by SCHAY, requires modification. Interest for this project in Commission I.3. (v) *Surfactant Purity Standard.* No news to report. (vi) *Liquid Crystals.* No progress. (vii) *Reporting Gas Adsorption Data.* Provisional draft by HAUL.

5. *Other Contacts during General Assembly:* (i) Clinical Chemistry (on the use of the new unit 'katal'). (ii) With Commission V.2 (tentative stage). (iii) With Commission I.1 (on intermolecular forces). (iv) With Prof. CHATT (on isotopic displacements and heteropoly-acids).

6. *Standard Catalyst/Company Associates Group.* Subcommittee under Prof. EVERETT. Review of existing efforts leads to recommendations: (i) Encourage IUPAC sponsoring of International Symposium on Science and Preparation of Heterogeneous Catalysts, September 1978, Belgium. (ii) Formalization contact ASTM-I.6, preferably through a liaison. (iii) IUPAC support for British programme under SING. (iv) Promote international cooperation in synthesis in pilot plant scale of a series of catalysts having a gradation of structural features. Items (iii) and (iv) require IUPAC funding, US-\$2000 and US-\$20 000 respectively to be asked.

7. *Other Activities:* (i) The book *Physical Chemistry: Enriching Topics from Colloid and Surface Science* has now a second edition. (ii) International Coordination of Surface and Colloid Science will be pursued more actively by creating an International Newsletter.

Present: Dr. K. J. MYSELS (Chairman), Prof. R. HAUL (Vice-Chairman), Prof. J. LYKLEMA (Secretary), Prof. R. L. BURWELL, Jr., Prof. R. S. HANSEN (Titular Members), Prof. J. HABER, Prof. P. MUKERJEE, Dr. L. TER-MINASSIAN-SARAGA, Prof. E. WOLFRAM (Associate Members), Prof. W. SCHIRMER, Prof. D. H. EVERETT (National Representatives), Dr. D. E. DAY, Dr. J. D. E. RAMSEY, Prof. W. PALOZEWSKA (Observers).

Subcommittee on Catalyst Activity

Meeting: 12 August 1977

1. The subcommittee discussed the action to be taken by Commission I.6 in response to the request

from ICAG that IUPAC should tackle the problem of 'Correlation of chemical and physical structure of heterogeneous catalysts with activity'. Commercial catalysts to be introduced for study where possible.

2. The following basic objectives were examined: (i) agreement on experimental procedures for studying heterogeneous catalytic reactions, and on the apparatus parameters which need either to be standardized or allowed for quantitatively; (ii) availability of reference catalysts to enable reliable checks to be made of the comparability of techniques used in different laboratories; (iii) the establishment of a coordinated international study of catalyst activity and structure.

3. Catalyst testing in all its aspects (structural and activity) was discussed. Many groups (ASTM, IUPAC/SCI/NPL, EEC, COMECON, ICIC, etc.) are already active. Liaison between various groups should be encouraged, possibly through I.6. The proposal to include a session on catalyst characterization in the Symposium 'Scientific Basis for the Preparation of Heterogeneous Catalysts' being organized by the Soc. Chim. Belge in September 1978 was strongly supported. This Symposium should be given IUPAC sponsorship.

4. The subcommittee endorsed support for the current joint project of IUPAC/SCI/NPL. Successful execution of this work needs the injection of substantial sums for the purchase of some of the more expensive catalyst samples. ICAG could help by encouraging their members to give financial support.

5. A plan to establish an 'International Study of Catalyst Activity and Structure' coordinated by a specialist IUPAC subcommittee was considered. Given adequate financial backing, such a programme could have far-reaching effects both on the fundamental study and the practical application of catalysts. Such a project would require careful planning and the catalysts employed should be prepared on an adequately large scale, and this would imply the

use of industrial pilot plant facilities, probably on a contract basis.

It was agreed to put this proposal to Commission I.6. It represented the most effective way in which progress towards the objective proposed by ICAG could be achieved. It would, however, be unwise to embark on such a project without the assurance that ICAG, or selected members of it, would be prepared to provide substantial financial backing.

6. *Recommendations.* The following recommendations were made to Commission I.6:

(i) that should the organizers of the Symposium 'The Scientific Basis for the Preparation of Heterogeneous Catalysts' seek IUPAC sponsorship, then this should be strongly supported by Commission I.6;

(ii) that the Commission should continue its sponsorship of the Catalyst Reference Materials Project, and should suggest that ICAG should provide some financial support for this work;

(iii) that should there be an indication that major financial backing might be forthcoming from ICAG, the Commission should establish an expert subcommittee to explore the feasibility of establishing an 'International Study of Catalyst Activity and Structure' coordinated through IUPAC Commission I.6;

(iv) arising from minor points raised during the meeting, Commission I.6 should bear in mind the possibilities in due course of (a) preparing a set of IUPAC recommendations for the testing of catalyst reference materials, being a coordination of various national and international recommendations, (b) preparing a chart of the characteristics which need to be established for catalysts of different kinds, (c) sponsoring an edited IUPAC book on catalyst characterization and testing, including catalyst life and deactivation.

Present: Prof. D. H. EVERETT (Chairman), Prof. R. L. BURWELL, Prof. R. HAUL, Prof. J. HABER, Dr. D. A. DOWDEN, Dr. L. MOSCOU, Dr. R. CAHEN.

II. INORGANIC CHEMISTRY DIVISION

DIVISION COMMITTEE

Meeting: 12 and 17 August 1977

1. Prof. MALATESTA welcomed Members of the Committee. The most important activities of the Division since the 1975 Meeting in Madrid (see *Comptes Rendus 28th Conference: Part B*, pp. 205–209) were concerned mainly with (i) Names of elements beyond 100; (ii) Commission on Nuclear and Radiochemistry; (iii) Meeting of the CNIC (Paris 1976); Meeting of SAIC (Paris 1976); Meeting of Commission II.3 (Rome 1976).

Sponsorship had been given since the Madrid meeting to the following Conferences:

- V International Conference on Nonaqueous Solutions: Leeds, July 1976
- IMEBORON III: Munich and Ettal, July 1976
- XVII International Conference on Coordination Chemistry: Hamburg, September 1976
- International Symposium on Materials for High Temperature Energy Sources: Odeille, June–July 1977
- XVIII International Conference on Coordination Chemistry: Sao Paulo, July 1977
- VIII International Conference on Organometallic Chemistry: Kyoto, September 1977
- IV International Conference on Solute–Solute–Solvent Interactions: Vienna, September 1978
- VI International Conference on Nonaqueous Solutions: Waterloo (Canada), August 1978
- V International Conference on Crystal Growth, 1978
- International Symposium on Ions and Ion Pairs: Syracuse (NY), May–June 1978
- XIX International Conference on Coordination Chemistry: Prague, September 1978

Prof. MALATESTA represented the Union at IMEBORON III and at XVII and XVIII International Conferences on Coordination Chemistry.

2. The Report of the President to Council (see *IUPAC Inf. Bull.*, 1978, No. 1, pp. 14–15) was fully agreed. Reports of Chairmen of Commissions were discussed and approved.

3. As regards the proposed Commission on Nuclear and Radiochemistry the Committee does not consider the present time appropriate to allocate the proposed activities to any specific division and thus

proposes to the Bureau of IUPAC to prolong the corresponding *ad hoc* Committee and in particular to instruct its members to have consultations with other international bodies, especially IAEA and IUPAP, with the view to defining terms of reference and scope of activities to avoid duplication. The *ad hoc* Committee is to be asked to report on the progress by the middle of 1978. It was agreed to support strongly the original proposal to establish an Interdivisional Committee on Nuclear and Radiochemistry.

4. Report on the Executive Meeting of the Division Officers was given and its minutes approved. In the discussion it was suggested to use the Membership of the Division to publicize Division activities. It was agreed to appoint one of the Members of the Division Committee to take over the preparation of 'News release' of the Division; the Member to be appointed by the new Division President.

5. The future policy of the Division was discussed at considerable length. It was concluded that there exists a small contact with inorganic community mainly due to the limited range of activities of the Division. Primary concern of the Division and its Commissions should be the international agreement on units, symbols, nomenclature and standardization; characterization; and reference data. It was felt necessary to stimulate projects and research to acquire the necessary data in a systematic way.

It was suggested to extend the activities of Commission II.3 to inorganic solids in general. An *ad hoc* Committee was established (Profs. GREENWOOD, ALCOCK, FITZER, STEELE) to consider the implications of the proposal to extend the activity in the direction of inorganic solid material. The *ad hoc* Committee will report to the Division Committee at the next General Assembly.

6. The sponsorship to the IVth IMEBORON was recommended.

7. The Division Committee approved the reports of the Commissions as given hereunder:

Commission II.1. New definition of atomic weight, resulting from the discussion at the open meeting, was approved. No press release was to be issued yet. It was agreed to include US-\$4000 into the budget of the Division to cover the meeting of Commission II.1 in 1978.

Commission II.2. It was agreed to recommend to the Bureau to increase the number of Associate Members

of the Commission to 12. The Commission should meet in 1978 and it was agreed to allocate US-\$7000 for this Meeting in the budget. Recommendations as regards the names of elements beyond 100 were approved.

Commission II.3. The report including future policy of the Commission was approved. Prof. ALCOCK was asked to present proposals for new bodies to the executive of the Division by the end of 1977.

8. Elections to the Commissions were approved.

Commission II.3: It was approved to extend the period of service of the Chairman and Secretary. It will be recommended to the Bureau to re-appoint Prof. FRITZ for 2 more years (total 10). This is strongly supported by his appointment as Chairman of a new subcommittee of the Commission.

9. The Division Committee approved the election of new Members of the Committee, carried out at the Open Meeting of Inorganic Division on 16 August, as follows:

Prof. A. A. VLČEK as Vice-President

Prof. Kazuo SAITO as Secretary

10. The Meeting was concluded by Prof. MALATESTA who expressed his thanks to all Members of the Division Committee whose term of service had expired.

Present: Prof. L. MALATESTA (President), Prof. N. N. GREENWOOD (Vice-President), Prof. A. A. VLČEK (Secretary), Prof. C. B. ALCOCK, Prof. W. C. FERNELIUS (in part), Prof. J. CHATT (in part), Dr. E. ROTH (17 August only).

COMMISSION ON ATOMIC WEIGHTS (II.1)

Meeting: 13–16 August 1977

1. *New Definition of Atomic Weight.* The Commission, according to the responsibility it accepted in 1975, after a joint meeting with other concerned IUPAC bodies, proposed the following new definition of an atomic weight of an element: 'The ratio of the mass per mole of atoms of that element to 1/12 of the mass of one mole of nuclide ^{12}C .' This definition removes the difficulties which arise from the reference made in the present definition to 'natural nuclidic composition'. Measurements in recent years have shown that natural compositions vary sufficiently, for a number of elements, to make it worthless as a precise concept.

This proposition was discussed, and endorsed at a common meeting with representatives of IDCNS, Commissions I.1, II.1, III.1, V.3, and the Committee on Teaching of Chemistry. It is hoped that IDCNS will formally propose the adoption of this definition.

2. *Review of Atomic Weights.* The Commission performed its regular element by element review and proposed the following changes to the table of Atomic Weights

Vanadium: from 50.9414 ± 0.0003

to 50.9415 ± 0.0001

Lutetium: from 174.97 ± 0.01

to 174.967 ± 0.003

It added to its list the atomic mass numbers of the longest lived isotopes of recently discovered elements. These are designated here by their provisional systematic symbols and names according to IUPAC recommendations.

| Atomic number | Symbol | Name | Atomic mass number |
|---------------|--------|--------------|--------------------|
| 104 | Unq | Unnilquadium | 261 |
| 105 | Unp | Unnilpentium | 262 |
| 106 | Unh | Unnilhexium | 263 |

The Commission discussed, but decided to introduce no change, in a number of specific cases including:

Ag, Au, Ce, Ga, H, Ho, Ni, Ru, Tl, Zn . . .

3. The Commission reviewed the results of its action for labelling of materials for isotopic composition, and decided to continue to call the attention of responsible bodies to its necessity.

4. *Report of Subcommittee on Assessment of Isotopic Composition.* The Commission had the report of the subcommittee on the Assessment of Isotopic Composition (SAIC). It gave precise directions to the SAIC subcommittee to prepare, at an interim 1978 meeting, for consideration by the full Commission in 1979, an updated table of isotopic compositions suitable for publication. Such a table will include ranges of natural variations, references to best measurements, indication of sources of standards of reference materials. It would tabulate isotopic composition with corresponding atomic weights and attempt to harmonize them with IUPAC adopted atomic weights; it will also include relative atomic masses of the nuclides. All of this material is now widely dispersed. In the opinion of the Commission its collection and evaluation should be the basis of a very valuable IUPAC report which would be published.

5. It was decided to undertake a continuing review of data on atomic weight and isotopic compositions of non-terrestrial material. The possibility of publishing a table, to a sufficient number of figures for a practicing chemist, but small enough to necessitate no change for 5 or 10 years, will be explored. A review of the abbreviations used for footnotes will be made. A survey of new methods for measuring isotopic abundances will be carried out.

Present: E. ROTH (Chairman), N. E. HOLDEN (Secretary), I. L. BARNES, P. J. De BIEVRE, W. H. JOHNSON, R. L. MARTIN, H. G. THODE, A. H. WAPSTRA, N. N. GREENWOOD, R. HAGEMANN, H. S. PEISER, N. SAITO (in part), L. MALATESTA and A. A. VLČEK (Inorganic Chemistry Division Committee, in part), D. DESMARTEAU (Observer).

COMMISSION ON HIGH TEMPERATURES AND REFRACTORY MATERIALS (II.3)

Meeting: 13–16 August 1977

1. *Agenda and Minutes.* The agenda proposed by the secretary was accepted. The minutes of the meeting in Rome, 20–23 September 1976, were agreed upon.

2. *Chairman's Introductory Remarks.* The philosophy of the Commission that it should stimulate new international collaborative research projects as well as assessing published literature has been approved by the Committee. A new Commission on inorganic solid state materials might be desirable.

3. Reports and New Activities

(a) *High Temperature Bibliography.* The report of Dr. HOCKING was received and it was agreed to raise the price to £5 per annum. DE MARIA undertook the task to improve the publicity. FITZER will contact Pion Ltd. about the Bibliography.

(b) Y_2O_3 . The melting point arrived at after the study was $2438 \pm 12^\circ C$ and the project is considered to be finished. FITZER will contact RUFFINO about standards. In 1979 the Commission will consider further work to produce a recommended value.

(c) *Fusion Data for Refractory Oxides.* A report by HLAVÁČ called for a collaborative study group to consist of ALCOCK, COUTURES, ANTHONY, PROKS and HLAVÁČ to study fusion data for oxide systems, of practical interest and as a function of oxygen pressure and composition.

(d) *Silicon-Carbide and -Nitride.* SERSALE reported on a preliminary investigation, which shows that there is need for a standardization of analyses as well as for characterization of microstructure and mechanical and physical properties.

(e) *Characterization of Carbon.* FITZER reported that the Task Force has now been expanded to 14 members from six countries. It is proposed to make this group into a subcommittee of our Commission, to be named 'International Committee on Carbon, Characterization and Terminology'.

(f) *PVT Data on Alkali Metals.* OHSE completed a literature review of measured and calculated critical point data of the elements. He undertook to form a Collaborative Study Group for an assessment of critical point data of the alkali metals.

(g) *Hot Corrosion.* AMATO reported that he could not propose a standard procedure. The Commission decided to invite Dr. RAHMEL for advise. MROWEČ undertook to carry out a preliminary survey of the definitions of various diffusion processes.

(h) *Solid Electrolytes and Reference Electrodes.* ANTHONY will take over the activities of STEELE and ask him for the samples.

(i) *Carbide-Carbon Eutectics.* DE MARIA and NOWOTNY concluded that suitable eutectics would be: $TiC-C$, $ZrC-C$, $HfC-C$, $NbC-C$ and $TaC-C$, to cover the temperature range of 2776–

3445°C. A preliminary literature survey will be carried out by DE MARIA.

(j) *Pyrometry.* FITZER will ask RUFFINO to complete his review. ANTHONY will contact CABANNES and FOEX about this matter.

(k) *Vapour Pressures.* No report came from GILLES. DE MARIA will send his comments to GILLES and HORTON.

4. *Future Policy.* The view of the Commission is that its composition should allow discussions on both methods and materials, and work in highly specialized areas. Some projects will be extended, e.g. vapour pressure studies to higher pressures and temperatures, optical pyrometry to faster measuring. The Commission will take interest in high temperature gas–solid interaction processes (C.V.D.) and standardization of microstructural characterization (porosity, grain size, etc.). Emphasis will be given to metallic systems including coatings and slags. The Chairman will contact the Division of Applied Chemistry about engineering materials. The Commission advocates joint conferences with other groups and will participate in the meeting of the European Thermophysical Group (Dubrovnik, 1978).

5. *List of Projects.* The following list will be submitted to the Division Committee:

- (i) High Temperature Bibliography
DE MARIA on going
- (ii) EMF Standard Electrodes
ANTHONY 1979 (Review)
- (iii) Vapour Pressure Standards
GILLES 1978
- (iv) Characterization of Carbon
FITZER on going
- (v) Fusion of Refractory Oxides
HLAVÁČ 1979 (Review)
- (vi) Critical Point Data
OHSE 1979 (Review)
- (vii) Si–carbide and –nitride
SERSALE 1978 (Review)
- (viii) Diffusion Processes
MROWEČ 1978 (Review)
- (ix) Carbide–Carbon Eutectics
DE MARIA 1978 (Review)

6. Membership

Titular Members: The Chairman and Secretary were re-elected for 2 years (extension granted). DE MARIA and HLAVÁČ were re-elected for 4 years. Elected were ANTHONY, GILLES, SPIELREIN and THOMAS for 4 years.

Associate Members elected for 4 years: FITZER (no extension as T.M. granted), HORTON, MROWEČ, OHSE, RAND, SATA, SERSALE, WORRELL. As National Representative for Austria is suggested: Prof. KOMAREK.

7. The Commission will try to arrange a meeting in Dubrovnik in June–July 1978.

8. The minutes were approved on 16 August 1977 in Warsaw and circulated to Members on 7 October 1977.

Present: Prof. C. B. ALCOCK (Chairman), Prof.

G. D. RIECK (Secretary), Prof. E. FITZER, Dr. J. HLAVÁČ, Prof. G. DE MARIA (Titular Members), Dr. A. M. ANTHONY, Dr. R. W. OHSE (Associate Members), Prof. S. MROWEČ, Prof. R. SERSALE (National Representatives), Dr. M. S. E. EL-SEWEFFI (Observer from Egypt).

IUPAC RECOMMENDATIONS ON SYMBOLS, UNITS, NOMENCLATURE, AND CONVENTIONS— SUPPLEMENTARY LIST

A complete list of current recommendations (as at the end of 1976) was published in *IUPAC Inf. Bull.*, Nos. 52/53 (May 1977), pp. 18–29. Listed hereunder are the new provisional recommendations as well as those provisional recommendations which have since been published in final (definitive) versions.

I. Physical Chemistry

1. *Recommendations for Symbolism and Nomenclature for Mass Spectroscopy* (Prepared by Commission on Molecular Structure and Spectroscopy). Published in *Pure Appl. Chem.*, **50** (1978), pp. 65–73.
2. *Expression of Results in Quantum Chemistry* (Prepared by Commission on Physicochemical Symbols, Terminology and Units). Published in *Pure Appl. Chem.*, **50** (1978), pp. 75–79.
3. *Recommendations for the Presentation of Infrared Absorption Spectra in Data Collections—A. Condensed Phases* (Prepared by Commission on Molecular Structure and Spectroscopy). Published in *Pure Appl. Chem.*, **50** (1978), pp. 231–236.
4. *Proposed Nomenclature for Transport Phenomena in Electrolytic Systems* (Prepared by Commission on Electrochemistry). Published as PNA No. 59 (July 1977).
5. *Electrode Reaction Orders, Transfer Coefficients and Rate Constants—Amplification of Definitions and Recommendations for Publication of Parameters* (Prepared by Commission on Electrochemistry). Published as PNA No. 60 (July 1977).
6. *Recommendations for Measurement and Presentation of Biochemical Equilibrium Data* (Prepared by IUPAC–IUB–IUPAB Commission on Biothermodynamics). Published as PNA No. 61 (July 1977).

III. Organic Chemistry and Biochemistry

1. *Nomenclature of Organic Chemistry: Section H—Isotopically Modified Compounds* (Prepared by Commission on Nomenclature of Organic Chemistry). Published as PNA No. 62 (July 1977).
2. *Nomenclature of Phosphorus-containing Compounds of Biochemical Importance* (Prepared by IUPAC–IUB Commission on Biochemical Nomenclature). Published as PNA No. 66 (December 1977).

3. *Nomenclature of Lipids* (Prepared by IUPAC–IUB Commission on Biochemical Nomenclature). Published as PNA No. 67 (December 1977).

4. *Nomenclature of Multiple Forms of Enzymes* (Prepared by IUPAC–IUB Commission on Biochemical Nomenclature). Published as PNA No. 68 (December 1977).

V. Analytical Chemistry

1. *Compendium of Analytical Nomenclature, Definitive Rules 1977* (Prepared by Analytical Chemistry Division). Published as a book by Pergamon Press, Oxford, 1978.
2. *Recommendations for Publication of Papers on Methods of Molecular Absorption Spectrophotometry in Solution between 200 and 800 nm* (Prepared by Commission on Analytical Nomenclature). Published in *Pure Appl. Chem.*, **50** (1978), pp. 237–242.
3. *Recommendations on the Usage of the Terms 'Equivalent' and 'Normal'* (Prepared by Commission on Analytical Nomenclature). Published in *Pure Appl. Chem.*, **50** (1978), pp. 325–338.
4. *Proposed Terminology and Symbol for the Quantity Representing the Transfer of Solutes from One Solvent to Another* (Prepared by Commission on Electroanalytical Chemistry). Published in *Pure Appl. Chem.*, **50** (1978), pp. 587–591.
5. *Recommended Nomenclature for Liquid–Liquid Distribution (Solvent Extraction): Revised 1975* (Prepared by Commission on Analytical Nomenclature). Published as PNA No. 63 (July 1977).
6. *Recommendations for Nomenclature of Thermal Analysis—II. DTA and TG Apparatus and Technique, III. DTA and TG Curves* (Prepared by Commission on Analytical Nomenclature). Published as PNA No. 64 (July 1977).
7. *Recommendations on the Nomenclature of Sampling in Applied Chemistry* (Prepared by Commission on Analytical Nomenclature). Published as PNA No. 65 (July 1977).
8. *Recommendations for Publication of Papers on Precipitation Methods of Gravimetric Analysis* (Prepared by Commission on Analytical Nomenclature). Published as PNA No. 69 (December 1977).
9. *Recommendations for Publishing Manuscripts on Ion-Selective Electrodes* (Prepared by Commission on Analytical Nomenclature). Published in *Provisional* form in *Inf. Bull.* (1978), No. 1, pp. 69–74.

III. ORGANIC CHEMISTRY DIVISION

DIVISION COMMITTEE

Meeting: 12, 14 and 17 August 1977

1. The Report of the Division President to Council (see *IUPAC Inf. Bull.* 1978, No. 1, pp. 15–17) was approved by the Committee.

2. The present procedure of election of new Officers and Members was reconfirmed. Prof. ZOLLINGER who has served 12 years as Committee Member and Officer would remain on the Committee as a Co-opted Member (Past-President) for 2 years.

3. *Reports of Commissions.* The Reports of Commissions III.1, III.2, III.3 and III.4 were approved. The next meeting of Commission III.1 will be held in Columbus, Ohio (USA) in 1978, provided there are no financial difficulties, while Commissions III.2 and III.3 will meet in York (UK) in September 1978, and in Leuven (Belgium) in July 1978, respectively. The Commission III.4 will remain affiliated with the Division. However, if the IUPAC Council considers in future creation of a new Division, such as a Division of Health and Environmental Chemistry, the Commission is willing to participate in its formation.

4. *Sponsorship and Organization of Symposia.* Sponsorship of the following symposia had been approved.

1977 30 August–2 September:

IUPAC–IUPHAR Symposium on Biological Activity and Chemical Structure, Noordwijk, Netherland

30 August–2 September:

International Mass Spectrometry Symposium on Natural Products, Kibbutz Anavim, Israel

12–16 September:

VIII International Conference on Organometallic Chemistry, Kyoto, Japan

1978 10–14 April:

IX International Symposium on Carbohydrate Chemistry, London, UK

31 May–2 June:

International Symposium on Ions and Ion Pairs and Their Role in Chemical Reactions, Syracuse, USA

24–28 July:

VII IUPAC Symposium on Photochemistry, Leuven, Belgium

24–29 July:

V International Symposium on Carotenoids, Madison, Wisconsin, USA

4–7 September:

VI International Symposium on Medicinal Chemistry, Brighton, UK

4–8 September:

IV IUPAC Conference on Physical Organic Chemistry, York, UK

7–10 September:

International Symposium on Marine Natural Products, Sorrento–Naples, Italy

17–23 September:

XI International Symposium on Natural Products, Varna, Bulgaria

11–15 September:

II International Conference on Organic Synthesis, Jerusalem/Haifa, Israel

The following applications for symposia were accepted:

XII Natural Products: 1980 Tenerife, Canary Islands (Prof. GONZALES; tentative application received only at the moment)

V Physical Organic: 1980 Santa Cruz, California (Prof. BUNNETT)

III Organic Synthesis: 1980 Madison, Wisconsin (Prof. TROST; tentative application received only at the moment)

IV Novel Aromatic Compounds: 1981 Israel (Prof. AGRANAT; tentative application received only at the moment; to be discussed with ISNA committee)

5. *The Budget.* Considerable increase to the proposed budget for 1978 was decided to be brought to the attention of the Treasurer, because (i) each of the Commissions needed roughly US-\$3000 in the past and as is proposed separately, (ii) in 1976, the year on which the Treasurer's proposal is based, one of our commissions did not claim the expenditure, so that an additional US-\$3600 should be proposed, and (iii) the Commission III.1 proposed to hold its meeting in Columbus, Ohio, in 1978, which the Committee approved because of its timeliness.

6. *Membership.* President: Prof. P. YATES; Past-President: Prof. H. ZOLLINGER; Vice-President: Prof. S. ITÔ; Secretary: Prof. J. MATHIEU; Titular Members (1975–79): Profs. G. MODENA, H. MUSSO and R. A. RAPHAEL; New Titular

Members (1977–81): Profs. I. P. BELETSKAYA (Moscow), J. F. BUNNETT (Santa Cruz), S. SAREL (Jerusalem), J. WRÓBEL (Warsaw). Co-opted Members: Drs. D. M. BROUWER, K. HEUSLER, SUKH DEV and H. TANIDA. New Co-opted Member (1977–79): Prof. H. ZOLLINGER. Re-election of the co-opted members who served on the Division Committee before 1977 will be considered in 1978.

7. Initiative in New Fields. (i) Organometallic chemistry (with emphasis of its application in organic synthesis or chemistry of the ligand), (ii) organic electrochemistry with emphasis of its application to organic synthesis, (iii) mammalian scents and pheromones, and (iv) biomimetic reactions and synthesis.

Present: Prof. H. ZOLLINGER (President), Prof. A. KJAER (Past-President), Prof. P. YATES (Vice-President), Prof. S. ITÔ (Secretary), Prof. G. MODENA, Prof. H. MUSSO, Prof. J. TOMKO (Titular Members), Dr. D. M. BROUWER, Prof. J. MATHIEU, Dr. H. TANIDA (Co-opted Members). **Present in part:** Prof. N. LOZAC'H (III.1; Chairman), Prof. K. SCHAFFNER (III.3; Chairman), Prof. F. C. DE SCHRYVER (III.3; Secretary), Prof. E. J. ARIËNS (III.4; Chairman), Liaison Officer to Polish National Committee on Chemistry: Prof. J. WRÓBEL.

COMMISSION ON PHYSICAL ORGANIC CHEMISTRY (III.2)

Meeting: 13–14 August 1977

1. Membership. The resignation of Prof. Ch. RÜCHARDT (FRG) was accepted with regret. A number of proposals had been received concerning vacant Titular memberships and it was decided to elect Profs. G. ILLUMINATI (Italy), M. J. PERKINS (UK) and K. SCHWETLICK (GDR) as Titular Members. In addition, Dr. R. A. Y. JONES (UK) and Profs. R. D. GUTHRIE (USA), J. MARCH (USA) and A. STREITWIESER, Jr. (USA, previously Titular Member) were elected Associate Members. Cooperation with the Inorganic Division was emphasized and Dr. G. L. LEIGH (UK) has since been appointed Associate Member to ensure this.

2. Collaboration with Japanese Working Group. The Chairman, Prof. ZOLLINGER drew the attention of the meeting to the existence of a Japanese working group headed by Prof. K. TOKUMARU working on nomenclature problems relating to the Commission's work and it was agreed to establish contact and exchange information with this group.

3. Reports of Working Parties

The first reports of the six working parties of the Commission were discussed and two of the Chairmen reported in person.

Definition of Terms. Prof. V. GOLD (UK) reported

that his working party on the definition of terms was preparing a second draft containing 309 entries. Copies of an incomplete version were distributed at the meeting. He estimated that a third and final draft could probably be sent to the IUPAC Secretariat early in 1979. Specific points in the second draft were discussed at the meeting.

Naming of Simple Transformations. Prof. J. F. BUNNETT (USA) summarized the activities of his working party on the naming of simple transformations. Members had examined the applicability of several nomenclature systems to cases in the literature and circulated their reports for comment. In addition a questionnaire which asked for comments on the nomenclature styles considered by the working party had been distributed to chemists in Europe and N. America. After discussion, a preferred style of nomenclature was agreed upon and it was decided that the working party would confine itself to substitution, addition and elimination reactions but Prof. M. P. DOYLE (USA, Observer) would Chair a working party to investigate oxidation–reduction reactions. Prof. BUNNETT estimated that a first draft of basic rules could be ready by March 1978.

Naming of Pericyclic Reactions. Prof. ZOLLINGER reported that attempts to set up a working party to deal with the naming of pericyclic reactions had been unsuccessful. Prof. K. N. HOUK (USA, Observer) volunteered to head a working group to investigate the naming of cycloaddition reactions with a possible extension to pericyclic reactions in general.

Naming of Complex Transformations. The meeting was in agreement with the approach taken by the working party on the naming of complex transformations but it was pointed out that a more rational approach would involve a graph-theoretical treatment. It was therefore decided that a separate working party should be set up to investigate the problems of describing both simple and complex reactions on the basis of graph theory. It was decided to ask Prof. C. J. COLLINGS (USA) to investigate the feasibility of such an approach.

Other Working Parties. Members were of the opinion that it was too early to offer detailed comment on the progress of the three working parties dealing with the symbolization of reaction mechanism models.

4. Next Meeting. The next meeting of the Commission will take place during the 4th IUPAC Conference on Physical Organic Chemistry, York (UK), 4–8 September 1978.

Present: Prof. H. ZOLLINGER (Chairman), Dr. J. R. PENTON (Secretary), Prof. J. F. BUNNETT, Prof. V. GOLD (Titular Members). **In attendance:** Prof. M. J. PERKINS (Wates Bursary Fellow), Prof. M. P. DOYLE, Prof. D. GORENSTEIN, Prof. K. N. HOUK (US National Committee for IUPAC, Travel Award recipients), Prof. G. MODENA, Dr. H. TANIDA—in part (Organic Chemistry Division Committee).

COMMISSION ON PHOTOCHEMISTRY (III.3)

Meeting: 13–15 August 1977

1. *Composition of the Commission.* Prof. QUINKERT, whose term has expired, is replaced by Prof. HOUK. Prof. HOYTINK, who expressed the desire to step down has been asked to continue to serve as an Associate Member. His position as a Titular Member has been filled by Prof. GRABOWSKI. The Titular memberships of Dr. LAMOLA and Prof. MUKAI has been extended. Full list of Commission Members has been published in *Membership Lists of IUPAC Bodies: 1977–1979*, pp. 106–108.

2. *Projects.* Task forces were designated for each of the following projects. Guidelines and basic principles were set for all of them. The exchange of information and cooperation with other Commissions and with international photochemistry associations will be stressed.

- (i) Coordination of International Symposia on Photochemistry: K. SCHAFFNER, F. C. DE SCHRYVER
- (ii) Recording of Photochemical Data: A. LAMOLA, M. WRIGHTON
- (iii) Nomenclature in Photochemistry: Z. GRABOWSKI, K. HOUK
- (iv) Chemistry Education and Photochemistry: T. MUKAI, F. C. De SCHRYVER

Present: K. SCHAFFNER (Chairman), F. C. DE SCHRYVER (Secretary), A. LAMOLA, T. MUKAI, M. WRIGHTON (Titular Members), D. TURNER (Associate Member), K. HOUK (National Representative), G. GRABOWSKY (Representing European Photochemistry Association).

COMMISSION ON MEDICINAL CHEMISTRY (III.4)

Meeting: 15 August 1977

1. *Education Committee.* The business followed a pre-arranged agenda. Highlights included a report from Prof. NAUTA of the Education Committee after discussion of which it was decided to re-orient the aims of the Committee to (a) establish a framework for teaching basic medicinal chemistry for implementation by others, especially in the under-

developed countries, and (b) to continue supporting advanced medicinal chemistry education along the lines initiated by the commission-supported QSAR summer schools which are conducted by the European Federation for Medicinal Chemistry (EFMC). A report from EFMC verifying the cooperation with the Commission was read as was a report of the EFMC-IUPAC joint QSAR working party.

2. *Affiliation.* The status of the proposed Division of Health and Environmental Chemistry was discussed and it was resolved to participate in whatever way IUPAC decrees should this Division materialize.

3. *Newsletter.* The Commission's *Newsletter* will continue to be edited and published by Dr. RACHLIN despite his retirement from the Commission.

4. *Sponsorship.* Commission-sponsored meetings discussed included the IUPAC-IUPHAR Symposium on Biological Activity and Structure (Noordwijkerhout, The Netherlands, September 1977) and the VIth International Symposium on Medicinal Chemistry (Brighton, UK, September 1978). The VIIth and VIIIth symposia of this series will be held respectively in Spain in 1980 and in Sweden in 1982 or 1984. The Commission agreed to recommend IUPAC sponsorship for the joint ACS-CIC medicinal chemistry symposium in 1982.

5. *New Business.* Among the items of new business was endorsement of Commission's participation in the International Toxic Chemicals Register if a practical means of doing so can be worked out.

6. *Membership.* New Titular and Associate Members were elected pending approval by the pertinent national organizations. For a complete list of Members see *Membership Lists of IUPAC Bodies: 1977–1979*, pp. 109–110 (Pergamon Press, Oxford, 1978).

7. *Next Meeting.* The next Commission meeting is scheduled for 3 September 1978 at Brighton (UK) prior to the VIth International Symposium on Medicinal Chemistry.

Present: Prof. ARIENS (Chairman), Dr. RACHLIN (Secretary), Dr. CAVALLA, Dr. HUMBER, Prof. MUTSCHLER, Prof. PROTIVA and Prof. SAREL. Also in attendance were Associate Members Prof. NAUTA and Dr. MATHIEU and Observers Dr. CURRON (UK), Prof. CAMPBELL (UK) and Prof. DOYLE (USA).

IV. MACROMOLECULAR DIVISION

DIVISION COMMITTEE

Meeting: 12 and 17 August 1977

1. The minutes of the Division Committee Meeting held in Paris on 3 July 1976 [see *IUPAC Inf. Bull.*, No. 54 (December 1977), pp. 53–59] were approved.

2. *Current Status of IUPAC-Sponsored Symposia and Microsymposia*
1977

—Prof. PEPPER presented a report on the International Symposium on Macromolecules, held in Dublin, 17–22 July. The symposium attended by about 300 participants had been very successful.

—Prof. KALAL reported on the 17th Microsymposium on Chemical Problems of Medical Polymers, to be held in Prague, 15–18 August (220 participants).

—Prof. NAKAJIMA reported that more than 3000 participants would attend the 26th IUPAC Congress in Tokyo, 4–10 September. During the four simultaneous sessions on Macromolecular Chemistry 280 papers would be presented. A post-congress Symposium on Biomedical Materials was to be held in Kyoto, followed by a Polymer Colloquium organized by the Society of Polymer Science, Japan (13–15 September).

1978

—The Microsymposium on Polymer Dispersions, organized by Prof. PHILIPP, would be held in Dresden (GDR) on 4–6 September 1978.

—18th Microsymposium 'Synthetic and Semi-synthetic Polymeric Catalysts and Affinants', 10–13 July 1978, and 6th Discussion Conference 'Chromatography of Polymers and Polymers in Chromatography', 17–21 July 1978, were to be held in Prague.

—Prof. PLATE presented the 2nd circular on the 25th International Symposium on Macromolecules, to be held in Tashkent, USSR, 17–21 October 1978.

1979

—27th IUPAC Congress, Helsinki, Finland, 27–31 August 1979; one section of this Congress will be devoted to the Chemistry and Technology of Natural Polymers.

—26th International Symposium on Macromolecules, Mainz (FRG), 17–21 September 1979;

Prof. SCHULZ presented the 1st circular on this meeting.

—19th Microsymposium 'Recent Aspects of Mechanisms of Degradation and Stabilization of Hydrocarbon Polymers', 9–12 July 1979 and 20th Microsymposium 'Microcalorimetry of Macromolecules', 16–19 July 1979, both to be held in Prague; the programmes were presented by Prof. KALAL and IUPAC sponsorship approved by the Division Committee.

1980

—International Symposium on Macromolecules, celebrating the 25th anniversary of Stereospecific Polymerization of α -Olefins, Pisa, Italy, 8–15 September 1980. IUPAC sponsorship for this symposium was approved by the Committee.

3. *Statutes and Bylaws for the Macromolecular Division*. A draft project proposed by Prof. BENOIT and Dr. de VRIES, was extensively discussed. A revised version would be circulated to the Members of the Division Committee before being submitted for approval by the IUPAC Bureau in 1978.

4. *Education and Training in Polymer Science and Technology*. A vote of thanks was passed to Prof. SHELDON (University of Bradford, UK) for preparing a survey report at the request of the Macromolecular Division. It was agreed that publication by IUPAC of a revised version of the report would be useful. Dr. BARRETT, Dr. ENGEL and Prof. OVERBERGER were asked to propose necessary revisions.

5. *Periodical IUPAC Publication on Polymer Science and Engineering Programmes in Universities*. A decision on this project was postponed until the Secretary of the Division is more fully informed about existing national publications. All Members and National Representatives were asked to supply the requested information to the Secretary.

6. *News Bulletin of the Macromolecular Division*. News Bulletin, No. 1, issued in 1976, had been published in a number of journals. It was agreed to issue a second News Bulletin in 1977.

7. *Commission on Macromolecular Nomenclature* (IV.1). Prof. JENKINS, Chairman of the Commission, presented a report on its activities and the documents prepared or in course of preparation for being published. The report was approved by the

Division Committee and a vote of thanks was passed to Dr. LOENING, past chairman of the Commission for the excellent work undertaken during his chairmanship. The proposed changes in membership were also approved to be submitted to the Bureau, as well as a further 2-years extension of membership for Dr. FOX (Secretary) and Prof. TSURUTA.

8. *Commission on Polymer Characterization and Properties* (IV.2). The report presented by the Chairman, Dr. BARRETT, was approved. It was agreed, in particular, that the Commission should have Associate Members appointed for a 2-year period. At present the Commission is composed of six Titular Members, one *ex officio* Member (President of the Division) and four Associate Members. Collaborative studies undertaken by the three existing Working Parties were to be continued. New topics were accepted for consideration and would be further discussed at the next meeting of the Commission in 1978.

9. *Elections and Changes in Membership*. Prof. V. A. KABANOV was elected President and Prof. C. H. BAMFORD, Vice-President of the Division. Prof. Z. JEDLINSKI (Poland), and Prof. M. MANDEL (Netherlands) were elected as Members. Dr. P. H. FINK-JENSEN was re-elected for 2 years as Co-opted Member. Prof. C. G. OVERBERGER and Prof. H. BENOIT were elected Co-opted Members for a period of 2 years. A motion of appreciation for the Past President, Prof. OVERBERGER was unanimously approved.

10. *Next Meeting*. Date and place of next meeting would be announced in due course (possibly London, August 1978).

Present: C. G. OVERBERGER (President), V. A. KABANOV (Vice-President), H. BENOIT (Past President), A. J. de VRIES (Secretary), C. H. BAMFORD, P. CORRADINI, A. NAKAJIMA, R. C. SCHULZ, F. H. WINSLOW (Members), P. H. FINK-JENSEN, A. KEPES, M. MANDEL, V. L. VAKULA (Co-opted Members), A. D. JENKINS, N. A. PLATE, W. RING (Commission IV.1), J. W. BARRETT, G. ALLEN, P. L. CLEGG (Commission IV.2), National Representatives: F. ENGEL (FRG), J. KALAL (Czechoslovakia), D. C. PEPPER (Ireland), Z. JEDLINSKI (Poland), E. W. NEUSE (RSA), I. M. PANAYOTOV (Bulgaria), B. PHILIPP (GDR), G. W. BECKER (Representative of IUPAP).

COMMISSION ON MACROMOLECULAR NOMENCLATURE (IV.1)

Meeting: 13–16 August 1977

1. The minutes of the meeting held in Dorking (UK) in June 1976 [see *IUPAC Inf. Bull.* Nos. 52/53 (May 1977), pp. 54–57] were adopted without change.

2. *Membership*. Dr. JENKINS was elected Chairman of the Commission to take office following the

Warsaw Meeting; Dr. FOX will continue to serve as Secretary. With the retirement of Drs. LOENING and CORRADINI as Titular Members, Drs. BIKALES and ALLEGRA (Italy) were nominated to replace them with 4-year terms as Titular Members. Drs. FOX and TSURUTA were nominated for 2-year extensions of their terms as Titular Members. Drs. DONARUMA (USA), KRATOCHVÍL (Czechoslovakia), LOENING (USA), MARCHESSAULT (Canada), MITA (Japan), and WETTON (UK) were nominated for 4-year terms as Associate Members.

3. *Stereochemical Definitions and Notation Relating to Polymers*. This document, edited by Dr. JENKINS, was reviewed in detail. Dr. JENKINS will distribute by 1 October a revised version of this document; replies with comment from Commission Members will be received up to 1 December. The final document will be forwarded to the Secretariat by 1 February 1978.

4. *Inorganic Polymer Nomenclature*. A proposal for a structure-based nomenclature for one-dimensional inorganic and semiorganic polymers, received from the Nomenclature Committee of the Division of Polymer Chemistry of the American Chemical Society was considered. The Commission was in substantial agreement with the views of the Commission on Nomenclature of Inorganic Chemistry, presented by Dr. POWELL, on this proposal. It was agreed that the proposal was worthy of further development, with emphasis on coordinated structures but that insufficient attention had been paid to the concept of directionality and repetition in analogy to organic polymers. A joint Working Party was formed to develop from the ACS document a nomenclature for coordination polymers; the WP consists of Drs. POWELL (Chairman), LOENING, PLATÉ, and TSURUTA, as well as Drs. DONARUMA and B. P. BLOCK from the ACS Committee.

5. *Polymer Classification*. Dr. PLATÉ discussed a revised version of the KORSHAK polymer classification proposal received earlier by the Commission. Copies of this version will be forwarded by Dr. PLATÉ to Commission Members for comment prior to further consideration at the next meeting of the Commission.

6. *Polymer Physics Definitions*. An outline, prepared by Dr. RING, of subject areas and terms within these areas that require definition was considered. It was agreed that this outline formed a useful basis for future documents from the Commission and that work to generate preliminary definitions should begin immediately. For this purpose, a Working Party was formed, comprising Drs. RING (Chairman), KRATOCHVÍL, and WETTON. It is anticipated that this Working Party will interact with Commissions IV.2 and I.6.

7. *Definitions and Terminology Relating to Rheology* (PNA No. 57). Drs. RING, CORRADINI and WETTON reported on a joint meeting with Commission I.6 on this subject area; in regions of overlap

between Commissions IV.1 and I.6, substantial agreement was noted.

8. *Subsidiary Definitions.* In the light of the definitions included in the documents discussed in Minutes 3 and 6, the original document (1975) prepared by Dr. TSURUTA was re-organized by him to become a document emphasizing chemical and process definitions relating to polymers. This was accepted for further refinement.

9. *Copolymers.* A document prepared by Dr. RING on copolymer nomenclature based on decisions at the 1976 (Dorking) meeting of the Commission was considered in detail. The possibility of expanding this document to include 'reacted' polymers, graft (branched) polymers, and 'star' polymers, was discussed. Dr. FOX will prepare a working paper on naming such polymers, as well as graft copolymers, on the basis of substitution principles.

Dr. KENNEDY agreed to prepare an analysis of the use of symbols of the copolymer document, as well as symbols and abbreviations, such as *b*, *g*, *alt*, *co*, and *ran*, in other fields of chemistry.

Precise definitions were discussed relating to 'random' or 'statistical' copolymers as contrasted to the extreme cases of alternating and block copolymers. Proposals were made that were based on reactivity ratios, on run numbers, and on A—A, A—B probabilities. The place of condensation (co)polymers in copolymer nomenclature and definitions was also discussed, and the concept of 'monomer pair' was considered. These issues were not decided definitively.

It was agreed that names in the copolymer document will be given in two forms of the type 'poly(A)—poly(B)' and 'block poly(A)—poly(B)'. 'Molar mass' will replace 'molecular weight' wherever it is appropriate.

10. *Next Meeting.* Proposals to meet at Moscow, Central Western Europe, and in the Naples area were received; decision was deferred pending discussion at the Division level. The meeting will take place in October (probably 11–14) 1978.

11. Dr. LOENING was given a standing ovation in recognition and appreciation of his outstanding and effective service as Chairman of the Commission from its inception in 1968 through the current meeting. The Commission is gratified that he is willing to continue to serve as an Associate Member.

Present: Dr. K. L. LOENING (Chairman), Dr. R. B. FOX (Secretary), Prof. P. CORRADINI, Prof. A. D. JENKINS, Prof. N. A. PLATÉ, Dr. W. RING, Prof. T. TSURUTA (Titular Members), Prof. N. M. BIKALES (Associate Member). Attending all or part of the meeting were: R. E. WETTON, J. F. KENNEDY (sponsored by Wates Foundation), Prof. C. H. BAMFORD, Prof. A. NAKAJIMA, Prof. C. G. OVERBERGER (Macromolecular Division Committee), Dr. W. H. POWELL (CNIC & CNOC), Prof. M. M. FISHER, and Prof. G. SMETS (IUPAC Vice-President).

COMMISSION ON POLYMER CHARACTERIZATION AND PROPERTIES (IV.2)

Meeting: 14 August 1977

1. *Membership.* At the present time membership comprises six Titular Members, one *ex officio* Member (President of Macromolecular Division), and three Associate Members. It was agreed to appoint the following new Associate Members: J. H. SAUNDERS, A. J. DE VRIES, H. BENOIT, C. G. OVERBERGER.

2. *Minutes of Previous Meeting.* Minutes of the meeting held in Antony (France) on 2 July 1976 [see IUPAC *Inf. Bull.*, Nos. 52/53 (May 1977), pp. 64–70] were confirmed after minor amendments.

3. Reports from Working Parties

The Division is asked to explore mechanisms for making available Working Party information to a wider public. In future Working Parties (WPs) will be designated as given hereunder:

WP I: Structure and Properties of Commercial Polymers

WP II: Molecular Characterization of Commercial Polymers

WP III: Supported Polymer Films

WP IV: Thermodynamic Properties of Polymers.

WP I: Structure and Properties of Commercial Polymers (Dr. CLEGG). The membership of the WP has remained approximately constant. One report has been published recently: 'A Collaborative Study on the Tensile Properties of Rigid PVC. Long-Time Transition' [*PAC* 47 (1976), pp. 333–339]. Three reports are in draft: (i) A Collaborative Study of Oriented Polymers—Rubber Modified Polystyrene; (ii) A Collaborative Study on the Mechanical Properties of Rigid PVC—Effect of Fillers; (iii) A Collaborative Study of the Melt Rheology of a Thermoplastic Elastomer of the A—B—A Block Copolymer Type. Work on four programmes has been initiated: (i) PVC Morphology/Rheology; (ii) Tubular PE Film; (iii) Impact Strength Testing; (iv) Orientation in Semicrystalline Polymers. The WP aims to complete its new programmes on a timescale of 2–3 years.

WP II: Molecular Characterization of Commercial Polymers. No report was available. The Secretary was instructed to obtain a report from Dr. SCHOLTE and circulate it to Members.

WP III: Supported Polymer Films (Mr. FINK-JENSEN). The WP had succeeded in extending membership in industry and academic institutions, obtaining 11 new Members. Contact with ISO has continued and the results of WP studies are incorporated in the corresponding ISO standards.

The Working Party has four projects in hand: (i) Analysis of Functional Groups in Amino Resins. Progress here is good and a literature report in the form of a separate paper will be published this year. (ii) Adhesion. Dr. J. SICKFELD is preparing a

paper on geometrical factors which influence the performance of films. Attention is also directed to the assessment of methods of measurement of adhesion in relation to performance. Dr. ZORLL is preparing a questionnaire as a preliminary to the definition of a study of the practical conditions leading to failure. (iii) Solvent-Polymer Interaction. There was no progress on this project but it is still considered to be an important area and Mr. S. M. KAMBANIS (Canada) is considering how the project can be revived. (iv) The Literature Retrieval Group continues its work but has received a disappointing number of replies from the East European countries. A report will be published based on information received prior to 1 August 1977. No future programmes will be introduced this year but four are being considered: (a) Difference in Properties between Thin Films and Bulk Polymers. (b) Compatibility of Amino Resins. (c) Rheological Properties of Films. (d) Behaviour of Functional Groups in Films. It was noted that the polymer-solvent programme could be related to the work of a possible new party on translocation of small molecules in polymers.

WP IV: Thermodynamic Properties of Polymers. No report was available from Dr. WILSKE, nor has he replied to two letters from the Division President. In view of the uncertain position it was decided: (a) Not to recognize this as a Working Party unless a satisfactory report is received. (b) To ask the Division President to write to Dr. WILSKE for a reply within 1 month.

Coordination of Programmes of WPs. The Commission agreed: (a) The most urgent action is to ensure that WP II becomes concerned with the characterization of the materials being used by WP I. The Commission notes that the membership of WP II may have to be extended and a new project may be required. (b) Molecular characterization problems will arise in WP III. Mr. FINK-JENSEN agreed to be responsible for placing these problems with WP II.

4. New Working Parties

Four topics were listed in the minutes of the last meeting; three further topics were added after

discussion: (i) Combustion Properties. (ii) Translocation of Low-molecular-weight Species in Macromolecular Systems. (iii) Surface Properties of Films and Fibres. (iv) Thermal Conductivity of Polymers. (v) Characterization and Estimation of Defects in Molecular Structure of PVC. (vi) Molecular Properties of Polymer Matrices and the Composites made from them. (vii) Definitive Values of Kinetic Parameters in Polymerization Reactions.

The following decisions were made: (a) 'Combustion Properties' was deferred pending reports on national programmes. (b) 'Thermal Conductivity' would form part of the activities of WP IV. (c) 'The Molecular Properties of Composites' was recognized to be of great importance but it was particularly difficult to define a programme. An enthusiast must be identified before we can proceed. (d) 'Kinetic Parameters of Polymerization Reactions' could be a suitable topic for the new initiative in kinetics under consideration by the Physical Chemistry Division which would require precise data to be obtained experimentally. The compilation of existing data might be appropriate to CODATA. The Chairman undertook to raise this issue with Dr. R. N. JONES, but in any case further consideration would be given to a Commission programme. The programme on PVC was considered to be essentially one of correlation of structure and performance properties and should be in WP I. Dr. CLEGG accepted the project. The Secretary undertook to inform Dr. A. MICHEL (CNRS, France).

Two topics were accepted for further consideration: (i) Dr. D. T. CLARK (Durham University, UK) will be invited to outline a collaborative programme on the 'Surface Properties of Films and Fibres'. (ii) Dr. H. SCHUCH (BASF, FRG) will be invited to outline a collaborative programme on 'Retention and Migration (of small molecules) in Polymers'.

Present: J. W. BARRETT (Chairman), G. ALLEN (Secretary), P. L. CLEGG, P. H. FINK-JENSEN (Titular Members), C. G. OVERBERGER (*ex officio* Member), H. BENOIT, A. J. DE VRIES (Associate Members), C. H. BAMFORD, M. MANDEL (Observers from Division Committee), P. SZEWCZYK (Observer from Poland), R. E. WETTON (Wates Bursary Fellow).

ANALYTICAL CHEMISTRY DIVISION

DIVISION COMMITTEE

Meeting: 12, 13 and 16 August 1977

1. *Opening Remarks by Vice-President.* Prof. WEST opened with a message to the Committee from Prof. TANAKA, Division President, in which he expressed his regrets and apologies for his absence due to a physical disability. The Committee noted with sorrow the death of one of its Members, Prof. H. KAISER, and of former Members of the Division, Prof. C. DUVAL, Prof. F. LUCENA CONDE, and Prof. S. VEIBEL.

2. *Previous Meeting.* The minutes of the meeting held in 1975 during the 28th Conference, Madrid (see *Comptes Rendus 28th Conference: Part B*, pp. 243–248) were approved.

3. *Matters Arising from Minutes of Previous Meeting not Discussed Elsewhere.* The matter of the style in which nomenclature reports should be written by the Division, which had been left unresolved at the Madrid meeting, was discussed. Agreement was reached to permit Commission chairmen to decide the style best suited to their particular requirements except that reports written in narrative style should contain an index of all terms defined in the report.

4. *Ratification of Decisions Taken by the Division Executive Committee.* The minutes of the Division Executive Committee meetings in Aberdeen, Scotland, 1976 [see *IUPAC Inf. Bull.*, No. 54 (December 1977), pp. 68–71] and in Oak Ridge, Tennessee, USA (1977) were reviewed. The Committee authorized the Vice-President to request from the Bureau that the President or Vice-President of the Analytical Chemistry Division should automatically be a member of the Coordinating Committee for Analytical Methods for CEE and IARC.

5. *Election of Committee Members.* (i) Prof. H. W. NURNBERG (FRG) and Prof. G. H. MORRISON (USA) were elected to serve the term 1977–81. (ii) The Nominations/Elections Committee for 1977–79 was selected: Mr. R. W. FENNELL (UK), Chairman; Prof. G. G. GUILBAULT (USA) and Prof. J. INCZEDY (Hungary).

6. *Division Finances.* The Division finances were discussed and the requested budget for 1978–79, as prepared by President TANAKA, of US-\$29 700, was reported.

7. *Statutes, Bylaws, and Division Rules.* (i) In response to the new IUPAC Statutes and Bylaws (Madrid 1975), the Division Rules and Guidelines were revised by the Division Executive Committee and presented to the Division Committee for approval. (ii) A final revision of the proposed Division Rules and Guidelines, particularly those rules that were questioned by the Secretariat in their formal review as not being in exact compliance with IUPAC Statutes and Bylaws, was approved to be submitted to the Bureau for ratification.

8. Collaboration with Other IUPAC and International Bodies

(i) Prof. FREISER reported on the arrangements for the Joint International Symposium on the Harmonization of Collaborative Analytical Studies co-organized with the Division of Applied Chemistry to be held on 9–10 March 1978 in London. The Clinical Chemistry Section and the Oil and Fats Commission are other IUPAC sponsoring bodies. Fifteen other international organizations have indicated their intention to participate as well as four invited observers: UK Assay Offices, British Standards Institution, US National Bureau of Standards and the Chemical Society Analytical Division. Prof. FREISER will be the official Division representative; a second representative will be appointed.

(ii) Prof. H. M. N. H. IRVING reported that the title of the trivial names project will be, 'A Guide to Trivial Names and Synonyms'.

(iii) Dr. WHITE reported that the mechanism for reviewing ISO draft methods with the Secretariat and ISO, formulated in Madrid 1975, was working satisfactorily. Feedback from ISO is minimal, however, which is a matter of concern to the Division.

(iv) The Division ratified continuing liaison with FECS and will have representatives at the meetings in Dublin 1979, and Helsinki 1981.

9. Division Publications and Other Business

(i) The *Compendium of Nomenclature* was completed by the committee of Profs. IRVING, WEST, and FREISER, and is ready for publication.

(ii) Further compendium affairs will continue to be a Division project. Profs. FREISER (Chairman), IRVING, and HUME will be members of the committee.

(iii) Authorship of IUPAC reports was discussed with the conclusion reached that reports should emphasize IUPAC and that authors' names not be listed on the cover sheet.

(iv) The inclusion of a new nuclear chemistry project to Commission V.7 was discussed. V.7 will report its findings at the Warsaw meeting.

10. Division Programmes. (i) Progress of the Commissions for the period 1975–77 was reviewed. Details are given in the Commission minutes. (ii) The Commission Projects for 1977–79 were discussed and approved. The proposed rosters of Commissions were approved for submission to the Bureau.

11. Coopted Members on Division Committee, 1977–79. The Division Committee agreed to accept coopted members and selected Prof. H. MALISSA (Austria) Chairman of the Working Group, FECS, as a coopted member. ICAG will be requested to appoint one member, and a third member will be selected later. Terms of membership will be for 2 years, 1977–79; members will receive all Division Committee correspondence, but will not have voting rights.

12. Any Other Business. (i) A new committee was established by the Division to prepare terms of reference for the Division Committee at the next General Assembly to assure that the objectives of the Division are current. Prof. PUNGOR will head the committee, with Profs. FREISER and NURNBERG assisting in preparing the terms of reference. (ii) Profs. IRVING and WEST reported on the document, 'Normality and Equivalent'. Comments by the Division Committee were considered and the revised document approved and submitted to IDCNS.

13. Concluding Remarks. Prof. WEST expressed his thanks to the members of the Division Committee for their support of the Division during the past 2 years and paid particular thanks to Prof. HUME whose membership on the Committee was about to terminate. He thanked the members of the Division Committee for their support during the meeting and said he would convey the Committee's thanks to Prof. TANAKA for his guidance of the Division during the past 4 years.

Present: Prof. T. S. WEST (Vice-President, in the Chair), Dr. J. C. WHITE (Secretary), Prof. G. DUYCKAERTS, Prof. H. FREISER, Prof. D. N. HUME, Prof. F. PELLERIN, Prof. E. PUNGOR, and Prof. S. B. SAVVIN (Members), Mr. L. S. BIRKS, Prof. H. M. N. H. IRVING, Prof. G. MORRISON, Prof. H. W. NURNBERG (Observers).

COMMISSION ON ANALYTICAL REACTIONS AND REAGENTS (V.1)*

Meeting: 13–15 August 1977

1. Previous Meeting. The minutes of the previous meeting held in Paris, May 1976 [see *IUPAC Inf. Bull.*, No. 54 (December 1977), pp. 21–24], had been distributed and accepted by correspondence.

2. Membership. Because of retirement of Prof. BELCHER from V.1, Prof. HULANICKI as the

new Chairman and Prof. INCZEDY as the Secretary were proposed and accepted. The terms of membership of Prof. SIGGIA, Dr. REIDINGER and Prof. WEISZ expired. The membership of Dr. KAPEL was extended for the next 2 years. Prof. den BOEF, Prof. ACKERMAN and Dr. STEPHEN were promoted to Titular Members and Prof. WANNINEN (Finland) was proposed as a new Titular Member. The following Associate Members were elected: Dr. J. RŮŽIČKA (Denmark), Prof. D. THORBURN BURNS (UK), Prof. L. SOMMER (Czechoslovakia), Prof. H. F. WALTON (USA), Prof. A. T. PILIPIENKO (USSR).

3. CEE Contract. No contract will be signed in 1977 because CEE has not prepared new criteria of purity for food additives.

4. ISO Cooperation. The sulphamic acid has been rejected by ISO mostly on the basis of non-scientific arguments. Efforts should be continued by Prof. THORBURN BURNS as a representative of the Commission V.1.

5. Recommended Methods for Polyphenols. This project, as the first part devoted to identification and determination of gallic esters, should be translated into English by November and circulated for comments—to be received by the end of January 1978.

6. Determination of Metals and Food Additives. It was pointed out that in spite of similar techniques of final determination (AAS) this differs from determination of trace metals in food, which needs special mineralization treatment. The methodology of determination in the project should be discussed with Commission V.4. The presented French version should be translated into English till December 1, and circulated for comments till end of February 1978.

7. Nonaqueous Acid–Base Indicators. The preliminary project was presented and a proposal of collaborative studies was accepted which will be carried out by Profs. ACKERMANN, SAVVIN, PELLERIN and probably SOMMER. Prof. PELLERIN will prepare a common sample for investigation and the other participants will add samples of indicators of local origin. The study should consist of TLC, investigation of IR and UV spectra, and determination of pH value for colour transition. By December 1977 a rigorous procedure of indicator investigation should be prepared and circulated among all members. This project should be finished in 1979 as 'Criteria Assessing the Purity of Nonaqueous Protometric Indicators'.

8. Amine Determination. The report on recommended methods on amine determination is currently being translated by Dr. KAPEL.

9. Compleximetric Indicators. The revised form was presented to avoid too elaborate presentation and excluding data on stability and composition of indicator complexes not critically evaluated. No derived data should be given (side reaction coefficients, pM–pH diagram etc.) and data on

*See p. 126 for joint meeting with VI.1 and VI.2.

titrimetric procedures should be shortened. The first part of the report as 'Recommendation on Publication of Data on Compleximetric Indicators' should be presented soon for publication, with a proper introduction which explains the purpose and scope of the project.

10. *Redox Indicators*. The comments of the Division Committee were discussed in full and introduced. Any further delay will make the project outdated.

11. *Standard Procedure for Expression of Results in Colorimetry and Fluorimetry*. Because of much controversy and criticism the project was withdrawn, and may be published in a scientific journal without any reference to IUPAC.

12. *New Projects*: (i) Prof. ACKERMAN presented a proposal for a new project 'Recommendations for Characterization of Photometric Methods of Determination'. It should be consulted with Commission V.4. An extended form of this proposal will be prepared for all Members. (ii) Prof. BELCHER will send copies of the project on 'Selectivity Index' and preliminary copies of the report on 'Amplification Reactions' to all Members. (iii) Prof. INCZEDY is willing to present a project 'Presentation of Data for Ion-Exchange Methods'. It will be useful to establish contact with other Commissions dealing with similar matters. Prof. INCZEDY will submit a scheme for this project.

13. *Other Business*. (i) The project concerning Reference Materials (REMCO) of that matter the existing information will be circulated among the Members of Commissions for comments. (ii) The methods of gas analysis (ISO) may be discussed in the future. (iii) Because of the variety of tasks of the Commission and a significant change in the membership it will be necessary to organize a meeting in Summer 1978.

Present: Prof. R. BELCHER (Chairman), Prof. A. HULANICKI (Secretary), Prof. J. INCZEDY, Dr. F. J. REIDINGER (Titular Members), Prof. G. ACKERMAN, Prof. F. PELLERIN (Associate Members), Prof. G. DUYCKAERTS, Prof. S. SAVVIN (National Representatives).

COMMISSION ON MICROCHEMICAL TECHNIQUES AND TRACE ANALYSIS (V.2)

Meeting: 14–16 August 1977

1. *Minutes of Previous Meeting*. The minutes of the meeting in Madrid (1975) had been published in *Comptes Rendus 28th Conference: Part B*, pp. 253–255.

2. *Reports Completed and in Progress*. In the following list reports marked with an asterisk (*) have either been published or are in the course of publication, those with a dagger (†) have been submitted to Division Committee for approval. Reports under preparation/discussion are marked §.

General Aspects of Trace Analytical Methods

- *III: Part 1. Present Status of Availability and Application (KOCH)
 - 2. Availability of Standard Reference Materials (KOCH)

†IV: Contamination in Trace Analysis (MIZUIKE and PINTA)

†V: Analysis of Solid Surfaces (MORRISON, GRASSERBAUER and CHENG)

§VI: Stability of Synthetic Standard Solutions (GOMIŠČEK, TÖLG, KOCH)

§VII: Applicability of Pressurized Sample Dissolution in Trace Analysis of Biological Materials (GOMIŠČEK)

§VIII: Practical Limits of Determination of Trace Analytical Methods (KOCH, LA FLEUR and MORRISON)

*Trace Analysis Applicable to the Determination of Minor Impurities in Chemicals. II: An Evaluation of Methodology for the Analysis of High Purity Mineral Acids (PINTA), *PAC*, 49, No. 6 (1977), pp. 893–904.

†Methods of Multielement Preconcentrations from Pure Lead by Precipitation of the Matrix (JACKWERTH)

§The Analysis of Organoboron Compounds (TERENT'EVA and GEL'MAN).

§Separation and Preconcentration of Substances. I: Evaluation of Techniques (MIZUIKE, ZOLOTOV and JACKWERTH).

§Recommended Methods for Pressure Decomposition (GOMIŠČEK and TÖLG).

3. *Proposed New Projects*. After intensive discussion of the goals of the Commission it was decided to emphasize important general aspects of modern trace analysis, organic trace analysis, modern microanalysis by physical methods and micro trace analysis in the new projects. Therefore the following proposals have been made:

General Aspects of Trace Analytical Methods:

IX: Recommended Methods for Reporting Accuracy and Precision (LA FLEUR).

X: Standardization in Organic Trace Analysis (LA FLEUR).

XI: Evaluation of Analytical Methods for Determination of Trace Elements in Biological Materials (GOMIŠČEK and TOWNSEND).

Graphical Representation of Trace and Microanalytical Schemes (TÖLG, MIZUIKE, JACKWERTH and ZOLOTOV).

Recommendations Concerning *in situ* Microanalytical Methods (GRASSERBAUER, HEINRICH and MORRISON).

Trace Analysis of Microsamples (PINTA).

It was decided that a detailed outline of all projects be submitted to Commission Members by December 1977 for review and approval.

4. *Membership.* Prof. GRASSERBAUER became Chairman and Drs. TOWNSHEND and LA FLEUR, Titular Members. Dr. B. GRIEPINK, Dr. K. HEINRICH, Prof. Z. MARCZENKO, Prof. MORRISON, Dr. J. M. OTTAWAY are new Associate Members, and Prof. I. JANAK the new National Representative. Full membership is given in *Membership Lists of IUPAC Bodies: 1977-79*, pp. 134-136 (Pergamon Press, Oxford, 1978).

5. *Next Meeting.* It was planned to hold a meeting of the Commission during the EUROANALYSIS Conference, Dublin, 20-25 August 1978.

Present: Prof. G. H. MORRISON (Chairman), Dr. M. PINTA (Secretary), Prof. K. L. CHENG, Prof. S. GOMIŠČEK, Prof. M. GRASSERBAUER, Prof. A. MIZUIKE, Prof. G. TÖLG, Dr. E. A. TERENT'EVA (Titular Members), Prof. E. JACKWERTH, Dr. P. LA FLEUR (Associate Members).

COMMISSION ON ANALYTICAL NOMENCLATURE (V.3)

Meeting: 13-15 August 1977

1. *Development and Publication of Methods of Analysis.* The part 'Precipitation Methods' was completed and sent forth as a provisional document.

2. *Ion Exchange Electrode Procedures.* The report was gone over in final form after comments were received from IDCNS.

3. *Compendium on Analytical Nomenclature.* Three camera-ready copies were submitted to IDCNS. The Commission decided to include the report on 'normality' and 'equivalence' as part of the *Compendium*.

4. *Equivalent and Normal.* This was discussed and the Commission agreed to include the following statement in the report. "It should be understood that this report is not a recommendation to use the terms 'equivalent' and 'normal' but is provided as a guide to permit those who are required, or feel they still need to use the former terminology and symbols, to do so in consistency with SI".

5. *Solvent Extraction.* A provisional report 63 has been issued and it was pointed out that in addition to this report, publicity has been given to the question of terminology in liquid-liquid extraction by a very similar article to be published in *Chemistry and Industry*, which will certainly receive larger publicity than ordinary IUPAC documents. In light of comments received, a finalized version will be prepared for discussion in London.

6. *Kinetic Methods of Analysis.* A preliminary document prepared was revised thoroughly and a final provisional document agreed on.

7. *New Projects.* (i) Presentation of results of chemical analysis. (ii) Terminology of environmental

analysis. (iii) Nomenclature of Radiochemical analysis. (iv) Nomenclature of liquid chromatography. (v) Nomenclature of surface analysis. (vi) Nomenclature of ion exchange.

8. *Membership.* Two new Titular Members were added: Dr. L. B. ROGERS and Dr. DAVE DYRSSEN. Four new Associate Members were added: Drs. W. SIMON, D. KLOCKOW, R. FREI, and J. BETTERIDGE. Dr. OSCAR MENIS completed his term as a Titular Member and became an Associate Member of the Commission.

9. *Joint Meeting with the Commissions I.1, II.1, and CTC.* At this meeting a new definition of the atomic weight was discussed and the following definition was proposed:

Atomic weight of an element is a ratio of the mass per mole of atoms of the element to 1/12 of the mass of an atom of nuclide ^{12}C .

The Chairman of this meeting was Dr. E. ROTH (France), who pointed out also that a table of atomic weights would be published after 1977. Considerable discussion ensued and centered around the use of the preferred term 'relative atomic mass' (atomic weight), rather than 'atomic weight'. The Chairman pointed out that this proposal was turned down by the Inorganic Chemistry Division Committee, and there was little he could do. The basic definition of atomic weight was changed from 'the element' to 'that element' in the definition above. The body present indicated its approval of the definition.

10. *Joint Meeting with Commissions I.3, V.3, and V.5.* Two items on the agenda were discussed: (i) The Ion Selective Electrode report drafted by Prof. GUILBAULT was discussed. Several suggestions were offered and the report as revised was essentially approved. (ii) The V.5 report on Manual of Symbols and Terminology for Physicochemical Quantities and Units was discussed. There were no comments from Commission V.3. Both reports were accepted as revised.

11. *Joint Meeting with Commission V.4.* Drs. MENIS and MELHUISH discussed the luminescence report and presented a revised outline which embodied a complete rethinking and reorganization of the entire report. It was agreed between the Commissions that the size of the document should only be about 20 typewritten pages and that a draft is to be prepared by Dr. MELHUISH with the assistance of Dr. MENIS, to be ready by 1 March 1978. It would then be discussed by a working subcommittee composed of Drs. MELHUISH and ZANDER of Commission V.4 and Drs. MENIS and GUILBAULT of Commission V.3. A final report would then be prepared for submission to both Commissions for approval. It is hoped that Commission V.3 would act on this document before the London meeting in December 1978.

It was decided that the project of Commission V.3 on 'Publication of Papers on Luminescence Spectroscopy' would be undertaken afterwards.

12. *Joint Meeting with the Commission on Automation in Clinical Chemistry.* The primary purpose of this meeting was to discuss the Commission V.3 project on Nomenclature of Automated Analysis, with GUILBAULT, PERONE, ROGERS, SIMON as coordinators.

The clinical group reported that their preliminary document on automation and clinical analysis was out, and they were very interested in a joint project on automation. They are particularly interested in handling data from specimen collection to report of information. Dr. GUILBAULT pointed out that the report should include data on microprocessor terminology and data acquisition (not covering information storage and retrieval, which is a separate project). The clinical chemists pointed out that a German document on Interfacing was out which could be useful in preparation of the report. Dr. ZETTLER suggested that we take the old V.3 document on automation prepared by Mr. FENNELL many years ago, and add terms related to clinical chemistry to prepare a new report. The Secretary will write to Drs. PERONE and SIMON, sending the clinical outline, our past reports and the German document, and solicit ideas on a total outline of terms to be defined. The contact on the clinical commission side will be Prof. M. HJELM.

COMMISSION ON SPECTROCHEMICAL AND OTHER OPTICAL PROCEDURES FOR ANALYSIS (V.4)

Meeting: 13–17 August 1977

1. Existing Projects

(i) Document IV: X-Ray Emission Spectroscopy. Final minor changes were made to this document and the corrected final version was submitted for approval to the main Commission.

(ii) Document V: Classification, Description and Nomenclature of Spectrochemical Light Sources. The 2nd draft of the report was discussed extensively. The decision was taken to produce a further draft in which much of the tutorial material would be omitted and in which gas discharge sources only would be treated. The Commission would then decide whether this document should be expanded to include other areas. Next draft due 1979.

(iii) Liaison with the IUPAC Commission on Quantities and Units in Clinical Chemistry. A report on the results of the ongoing liaison between Commission V.4 and the CQUCC was discussed by Commission V.4 and based on this, proposals were made to a joint meeting with the CQUCC and Commission I.5. A four-part series is planned by the CQUCC, as follows:

Part 1: Theoretical outlines and general quantities

Part 2: Molecular spectrometry of liquids and solid systems

Part 3: Molecular and atomic emission, absorption spectrometry in physico-chemical plasmas

Part 4: Characteristics of instruments.

Until now, most of the effort has been directed to Part 1, and most of the discussions between the three committees revolved around the format of the draft of Part 1. It was agreed to set up a sub-committee of three, representing CQUCC, Commission V.4 and Commission I.5 to ensure better liaison between the groups.

(iv) Document VI: Molecular Spectroscopy. A 3rd draft of this document was discussed, inputs also having been received from Commission V.3. Based on these discussions, a revised scheme was devised and proposed to Commission V.3. A 4th draft will be prepared jointly between V.3 and V.4 based on this new scheme.

(v) Name and Index List. This is a continuing task which expands to include each document as and when each moves to completion.

(vi) Translation of Documents. Translations of each completed document will be made into Russian, French and German languages.

2. New Projects

Four new projects were proposed: (i) X-ray Spectral Lines Nomenclature. (ii) Radiation Dispersive Instrumentation. (iii) Spectroscopic Quantitation of Low Levels by Environmental Pollution. (iv) Survey of Transition Probability Data. Project leaders and subcommittees were formed and each one will report at the next meeting.

3. Membership

Associate to Titular Members: Dr. BELYAEV, Mr. JENKINS, Dr. RUBESCA.

New Associate Members: Mr. BIRKS, Dr. PLSKO, Dr. OMENETTO, Dr. SCOTT, Dr. BUTLER.

Present: L. S. BIRKS (Chairman), R. JENKINS (Acting Secretary), R. MULLER, J. ROBIN, A. STRASHEIM, M. ZANDER, K. LAQUA, E. PLSKO, I. RUBESKA, YU. I. BELYAEV, W. H. MELHUISCH, L. R. P. BUTLER, R. O. SCOTT, W. C. HARRIS (Observers).

COMMISSION ON ELECTROANALYTICAL CHEMISTRY (V.5)

Meeting: 13–16 August 1977

1. *Minutes of Previous Meetings.* The minutes of the meeting in Madrid on 3–6 September 1975 (see *Comptes Rendus 28th Conference: Part B*, pp. 265–268) and of the special Interim Joint Subcommittee meeting of V.5 and I.3 held in Paris in 1976 [see *IUPAC Inf. Bull.*, No. 54 (December 1977), pp. 49–51] were approved.

2. *Reports.* Six reports had been published in final form since the Madrid Conference: *Pure Appl. Chem.* **44** (1975), p. 115; **45** (1976), pp. 81, 125, 131; **49** (1977), pp. 211, 217. In addition, two reports were in press and six other reports would be submitted to the Division Committee for approval for publication.

3. *Continuing Projects.* (i) Half-Wave Potentials in Propylene Carbonate (FUJINAGA, IZUTSU), (ii) Applications and Potentialities of Electro-analytical Techniques in Environmental Analysis (NÜRNBERG), (iii) Selectivity of Ion-Selective Electrodes (PUNGOR), (iv) Acid-Base Dissociation Constants in Dipolar Aprotic Solvents (IZUTSU), (v) Recommendations on Reporting of Electro-analytical Data (MEITES, JORDAN), (vi) Comparison of Electroanalytical Detectors with Other Detectors in Chromatography (PUNGOR), (vii) Electroanalytical Chemistry of Intermetallic Compounds in Mercury (GALUS), (viii) Diffusion Coefficients in Mercury (GALUS), (ix) Buffer Solutions for Testing Glass Electrodes at High Temperatures (COVINGTON, KANE), (x) Compilation of Dissociation Constants of Carboxylic Acids in Media of High Ionic Strength (NÜRNBERG), (xi) Indicator Electrodes in Nonaqueous Solvents (COETZEE), (xii) Potentiometry and Voltammetry in Marine Chemistry (BATES, NÜRNBERG), (xiii) Purification of Nonaqueous Solvents and Tests for Impurities (Coordinator: COETZEE). Revision and updating of 10 reports published by Commission V.5 since 1967.

4. *New Projects.* In order to avoid overlap with activities of other Commissions, projects judged to be of common interest were discussed with the appropriate Commissions. Such projects are indicated by asterisks. (i) *Formation Constants of Metal Complexes in Acetonitrile (KAPOOR), (ii) Electroanalytical Chemistry of Sulfur Compounds in New Coal Conversion Technologies (JORDAN), (iii) Critical Review of Individual Electroanalytical Techniques (MEITES), (iv) Half-Wave Potentials of Organic Depolarizers in Hexamethylphosphoramide (FUJINAGA, IZUTSU), (v) Response Times of Ion-Selective Electrodes and Potentiometric Cells (PUNGOR), (vi) *Solubility of Metals in Mercury (GALUS), (vii) Recommendations for Reporting Characteristic Potentials for Nonaqueous Solvents (MEITES).

5. *Liaison with Other Commissions.* Joint meetings were held with Commissions I.3, V.3 and V.6. Several topics of mutual interest were discussed. These included the report, 'Recommended Terms, Symbols and Definitions for Electroanalytical Chemistry', by Commission V.5, the planned revision of Latimer's 'Oxidation Potentials', and proposed changes in the operational definition of pH. Other matters discussed are reported in the detailed minutes of the Commission.

6. *Membership.* Nominations reflected the fact that Profs. NÜRNBERG and PUNGOR had been elected to the Division Committee, and that permission would be sought to extend the Titular Membership of Prof. GALUS for an additional 2-year period. Drs. COVINGTON and IZUTSU (previously Associate Members) and Prof. KAPOOR (previously National Representative) were nominated as Titular Members. Prof. BISHOP (who had retired as Titular Member) was nominated as Associate Member, as were the following new Associate Members: Dr. J. JUILLARD (France),

Dr. R. KALVODA (Czechoslovakia), Prof. P. PAPOFF (Italy), and Dr. W. F. SMYTH (UK). Finally, the following new nominations of National Representatives had been received from National Adhering Organizations: Prof. R. NEEB (Federal Republic of Germany) and Dr. H. V. K. UDUPA (India).

Present: Prof. R. G. BATES (Chairman), Prof. J. F. COETZEE (Secretary), Prof. E. BISHOP, Prof. T. FUJINAGA, Prof. Z. GALUS, Prof. J. JORDAN, Prof. H. W. NÜRNBERG (Titular Members), Dr. A. K. COVINGTON, Dr. K. IZUTSU, Prof. L. MEITES, Prof. E. PUNGOR (Associate Members), Dr. P. O. KANE, Prof. R. C. KAPOOR, Prof. W. KEMULA (National Representatives), Dr. W. F. SMYTH (Observer).

COMMISSION ON EQUILIBRIUM DATA (V.6)

Meeting: 13–16 August 1977

1. *Minutes of Previous Meeting.* The minutes of the Madrid meeting in 1975 (see *Comptes Rendus 28th Conference: Part B*, pp. 269–273) were approved.

2. *Stability Constants, Organic Ligands.* Dr. PERRIN reported that the manuscript of the Second Supplement, comprising the years 1968–73 (over 1100 pages) will be complete by early September and hopefully appear in print by January 1978. The project should if possible continue, and the Commission was glad to learn that Dr. PERRIN was willing to carry on as its leader.

3. *Stability Constants, Inorganic Ligands.* In a letter to the Chairman, Dr. HÖGFELDT had reported that he hoped to have his manuscript ready by the end of 1978.

4. *Critical Surveys of Stability Constants, Series A.* Prof. BECK reported that four surveys are now either in print or in the course of publication. Further surveys are in preparation, or being negotiated. Prof. BECK resigned as leader of the project, and was succeeded by Prof. OHTAKI.

5. *Critical Surveys of Stability Constants, Series B.* Prof. KERTES reported that in this series, treating extraction equilibria, four surveys are now either in print, or in the course of publication, and further surveys are under preparation.

6. *Liquid-liquid Distribution Equilibria.* Prof. KERTES reported that this series of comprehensive (non-critical) surveys had been closed. In all, four volumes had been issued, with closing dates 1971–72.

7. *Dissociation Constants of Acids and Bases.* Dr. PERRIN reported that Drs. B. DEMPSEY and P. SERJEANT will have the manuscript of the Supplement to Organic Acids completed by March 1978. The original compilation, by G. KORTÜM, W. VOGEL and K. ANDRUSSOW, covered the

literature up to and including 1956. The Supplement will cover the period 1957–70, and thus bring the organic acids up to the same closing date as the organic bases (by the 1972 Supplement).

8. Information Retrieval (Data Flagging). Prof. HUME reported that the flag list is now complete, and will be translated into French and German. He will then approach a number of journals in order to make them expose the flags, starting 1978.

9. Symbols for Mixed Ligand Complexes. Profs. HUME and NANCOLLAS had revised and completed the list which was adopted.

10. Critical Survey of Seawater Equilibria Involving Metal Ions. A position paper written by the Secretary suggested that such a survey would be desirable and feasible. The Commission postponed its decision to next meeting.

11. Critical Surveys of Metal Complexes of Biological Interest. A position paper written by Prof. ANDEREGG suggested that such a survey would be desirable and feasible. The Commission decided it should be undertaken, with Prof. ANDEREGG as leader.

12. Guidelines for Determination of Stability Constants. The Chairman had written a draft proposal for such guidelines. The draft was discussed and several changes and amendments proposed.

13. Solubility Project. The Commission met in a Joint Meeting with the subcommittee on Solubility Data. Prof. KERTES reported on the very substantial progress of this extensive project since the Madrid meeting, and on the decisions taken at the Blacksburg Meeting of the subcommittee in July 1976. The project is divided in three parts, viz. I: Gases in Liquids (Coordinator H. L. CLEVER); II: Liquids in Liquids (Coordinator A. F. M. BARTON); and III: Solids in Liquids (Coordinator M. SALOMON). The first manuscript (in Part I) is expected already in March 1978. A Sample Booklet, presenting the project and giving a few samples of the information it proposes to collect has been printed, primarily in order to assist in the recruitment of compilers and evaluators.

14. Membership. Dr. HÖGFELDT resigned as Titular Member. Prof. OHTAKI was elected new Titular Member. Three vacancies as Associate Members, after Profs. CLIFFORD, FREISER and OHTAKI, were filled by the election of Profs. H. L. CLEVER, L. D. PETTIT and Dr. M. SALOMON. Dr. A. BARTON was admitted as national representative for Australia and Prof. A. BYLICKI as national representative for Poland.

15. Next Meeting. An informal meeting will possibly be arranged in connection with the International Conference on Coordination Chemistry in Prague in September 1978.

Present: Profs. G. H. NANCOLLAS (Chairman), S. AHRLAND (Secretary), G. ANDEREGG, M. T.

BECK, H. FREISER, D. N. HUME, A. S. KERTES, Y. MARCUS, H. OHTAKI, Drs. D. D. PERRIN, J. STARY, R. F. DALTON (Observer).

Subcommittee on Solubility Data

Meeting: 13 and 16 August 1977

1. Minutes of Previous Meeting. The minutes of the subcommittee Meeting in Blacksburg, Virginia, USA, 9–11 July 1976 require an amendment since it was incorrectly stated that Dr. L. H. GEVANTMAN preferred to retain his observer status rather than accept the nomination for membership. The minutes thus amended were adopted.

2. Systems Coordinators. The position of Systems Coordinators, established at the Blacksburg meeting of the subcommittee, has been further discussed and defined. Their responsibility is to recruit compilers, evaluators and volume editors, and serve as liaison between the volume editors and the Publisher. Dr. CLEVER was reappointed as Systems Coordinator for gas/liquid, and Dr. SALOMAN for solid/liquid systems, and Dr. BARTON was newly appointed for liquid/liquid systems.

The appointment of System Coordinators for additional areas such as systems of molten metals and alloys, molten salts and slags, ceramics, natural water, and biosystems has been deferred. Dr. GEVANTMAN will assist in recruiting experts in these fields.

3. Gas/Liquid Systems. The progress report of Drs. BATTINO, CLEVER and YOUNG was presented by Dr. CLEVER. The titles of the volumes, the estimated dates of publication, the list of contributors and volume editors has been approved. Two or three volumes on rare gases will be ready by mid-1978. At least two volumes on nitrogen halides and carbon oxides will be ready by 1980.

The text of the Introductory Material for the gas solubility volumes, drafted by Drs. BATTINO, CLEVER and YOUNG has been presented for comments. It has been noted that the progress on this topic has been exceptional.

4. Liquid/Liquid Systems. Progress for these systems has been slow due to the fact that no systems coordinator has been appointed before. With the appointment of Dr. BARTON, it is expected that within a year a publication schedule will be proposed. Dr. HAULAIT-PIRSON presented drafts for compilation and evaluation of several systems.

5. Solid/Liquid Systems. Dr. SALOMON reported on his recruiting activities. Some 40 experts are presently contributing to the project, when each contributor is being asked to produce about 100 manuscript pages in a year's time. The first volume on silver halides will be ready for publication in 1978. Plans for 1979 include volumes on metal fluorides, bromides and iodides, mercury halides; work has also started on metal carboxylates, oxides and hydroxides and solid aromatic and halogenated organic compounds, but no volume editors have yet been assigned.

The Guidelines for compilers/evaluators will be revised by inclusion of additional samples.

6. *Sample Booklet*. A 48-page Sample Booklet, under the editorship of Dr. BATTINO has been published. It outlines the aims and scope of the Solubility Data Project, and gives a number of samples on the compilation and evaluation format. Copies, free of charge, are available on request.

7. *Recruitment of Contributors*. It has been decided to launch a repeated effort to recruit Soviet scientists. A scheme by which Dr. NANCOLLAS will visit Moscow has been defined, and Dr. GEVANTMAN will explore the possibility of cooperation via Gosstandard.

An agreement was reached that the group at the Polish Academy of Sciences, presently engaged in the compilation of thermodynamic data relevant to the project, will join the Solubility Data Project. The Polish contribution will be coordinated by Prof. BYLICKI, who was appointed as the Polish National Representative to Commission V.6, and individual scientists of the Polish group will be in contact with the appropriate Systems Coordinators.

8. *Status of the Subcommittee: Membership*. The parent Commission V.6, at a joint meeting, was informed of future plans to change the status of the subcommittee to that of a Commission. The proposal is based on the fact that membership of the subcommittee has a different expertise make-up than that of its parent Commission, and is unique in being mission oriented.

Nomination for membership of Dr. L. H. GEVANTMAN, U.S.A., has been submitted to the Division President.

9. *Future Meeting*. If the problem of financing the meeting can be solved, the subcommittee will meet in June or July 1978 at Emory University, Atlanta, USA.

Detailed minutes of the meeting are available on request, along with other documents on the project.

Present: Prof. A. S. KERTES (Chairman), Prof. A. F. M. BARTON, Prof. H. L. CLEVER, Prof. G. H. NANCOLLAS, Dr. M. SALOMAN, Dr. E. WILHELM, Dr. C. L. YOUNG, Dr. L. H. GEVANTMAN (Observer), Dr. T. HEPEL (Observer), Dr. Z. PAWLAK (Observer) and Dr. M. CL. HAULAIT-PIRSON (Observer).

COMMISSION ON ANALYTICAL RADIOCHEMISTRY AND NUCLEAR MATERIALS (V.7)

Meeting: 13–15 August 1977

1. *Minutes of Previous Meetings*. The minutes of the meeting in Madrid held during 3–6 September 1975 had been published in *Comptes Rendus 28th Conference: Part B*, pp. 286–292. The minutes of the interim meeting in Munich on 15 September 1976 had been submitted to IUPAC Secretariat.

2. Reports

Published: Recommended Procedure for the Measurement of 14-Mev Neutron Fluxes from Accelerators for Activation Analysis [*Pure Appl. Chem.*, **49** (1977), pp. 399–401].

Submitted: (i) Ion Exchange Separations in Radioanalytical Chemistry. (ii) Recommendation of Bowen's Kale as a Reference Material for Trace Analysis by Radioanalytical Methods. (iii) Glossary of Terms for Use in Radioanalytical Chemistry. (iv) The Role of Nuclear Techniques in the Determination of Key Elements in Environmental Pollution: I. Lead (withdrawn from publication).

3. *Projects Completed*. (i) Glossary of Nuclear Terms (Project leader: Dr. SMALES and Ir. de BRUIN). (ii) Data Flagging Project (Project leader in V.7: Prof. WAINERDI). (iii) Light Element Analysis by Radioanalytical Methods (Project leader: Dr. CRESPI). (iv) Radioactive and Isotopic Specifications of Labelled Compounds (Project leaders: Drs. GIRARDI and COMAR). (v) Nuclear Techniques for the Analysis of Molecular Compounds (Project leader: Prof. KOSTA). (vi) Compilation of Radioanalytical Data (Project leader: Prof. HOSTE).

4. *Projects in Progress*. (i) Teaching Aspects of Radioanalytical Chemistry (Project leader: Ir. de BRUIN succeeding Prof. SAITO). (ii) Separation Techniques in Radioanalytical Chemistry (Project leader: Prof. SAITO). A part of the collected data was distributed at the Warsaw meeting. (iii) Analytical Aspects of Dating of Carbonates and Water by Uranium and Thorium (Project leader: Dr. RAFTER). A status report was submitted for comments at the Warsaw meeting. (iv) Initial Survey of the Radioanalytical Problems Associated with Fusion Reactors (Project leader: Dr. CRESPI). A status report was sent to the Secretary for distribution at the Warsaw meeting. (v) Reference Materials and Intercomparison Samples in Radioanalytical Chemistry (Project leader: Dr. STEINNES). (vi) Study of the Possibility to Organize a World Conference on Radioanalytical Chemistry and Nuclear Materials (Project leader: Prof. WAINERDI). (vii) Critical Evaluation of Radioimmunoassay and Related Methods (Project leaders: Dr. COMAR and Prof. FRANCHIMONT).

5. Proposed New Projects

(i) Method for the Analysis in Fissile and Fertile Elements (Project leaders: Dr. SANKAR DAS and Dr. SZABO). The Commission agreed to the amalgamation of present two projects in progress and the change of title. The present projects are: (i) Analysis of Thorium and Thorium Compounds, and (ii) Nuclear Methods for the Analysis of Fissile Elements. A draft report entitled 'Analytical Chemistry of Thorium: A Compilation of Recent Data' by Dr. SANKAR DAS was submitted to the Warsaw meeting for comments.

(ii) Standardization of Graphical Presentation of Radiochemical Separation Schemes (Project leader: Dr. GIRARDI). Dr. GIRARDI wished IUPAC to

consider the possibility of suggesting a normalized way of graphical presentation of radiochemical separation schemes. A letter explaining his idea was distributed at the Warsaw meeting.

(iii) Counting Errors in Radioactivation Analysis (Project leader: Prof. LUX). Prof. LUX stressed the need for an IUPAC recommendation for a symbol for the counting error as well as an IUPAC recommendation for describing in publications both the counting statistics standard deviation and the normal standard deviation.

(iv) Recommendations for the Presentation of Experimental Requirements for Radioanalytical Methods of Analysis (Project leader: Ir. de BRUIN). Ir. de BRUIN proposed by circulating a brief note that IUPAC consider the value of recommending the inclusion of such data as sensitivity, precision and accuracy, cost and analysis time in future publications on radioanalytical techniques.

6. *Proposal for a Joint Project.* The Commission recommended that if a joint project on nomenclature covering the field of radiochemical analysis proposed by Commission V.3 should be approved the persons responsible in each Commission should be named specifically.

7. *Terms of Reference of Commission.* Members of Commission V.7 present at the Warsaw meeting discussed the Commission's terms of reference and the terms of reference of the proposed Commission on Nuclear and Radiochemistry. It was difficult to clearly differentiate fields of study where nuclear and

radiochemistry differed from radioanalytical chemistry and nuclear materials.

8. *Membership.* Prof. WAINERDI was re-elected Chairman and Prof. SAITO re-elected Secretary of the Commission. Dr. SANKAR DAS was re-elected Titular Member. New Titular Members elected were: Dr. COMAR, Prof. LUX and Dr. STEINNES. New Associate Members were elected as follows: Dr. SZABO, Ir. de BRUIN, Prof. FRANCHIMONT and Prof. KOSTA. Dr. COOK and Dr. CRESPI remain Associate Members. Prof. CORSKI was accepted as National Representative for Poland by correspondence. Dr. AMIEL and Prof. PAPPAS were proposed to the Division Committee as new additional Titular Members. It was also recommended to increase the present number of Associate Members from six to eight.

9. *Other Business.* (i) Current Application of Semiconductor X-ray Detectors in Chemical Analysis. Dr. RAFTER reported that this review had been withdrawn from publication by IUPAC because it had been approved within Commission V.7; other reviews had been published that more-or-less covered the same ground. (ii) Proposed meeting of Commission in 1978. Members of the Commission supported Prof. WAINERDI's plan to hold an interim meeting in 1978.

Present: Dr. T. A. RAFTER (Acting Chairman), Prof. N. SAITO (Secretary), Prof. L. KOSTA, Dr. M. SANKAR DAS (Titular Members), Prof. F. LUX (Associate Member), Ir. M. de BRUIN (National Representative).

VI. APPLIED CHEMISTRY DIVISION

DIVISION COMMITTEE

Meeting: 12, 16 and 17 August 1977

1. The minutes of the meetings of the Committee held in Frankfurt 8–9 July 1976 [see *IUPAC Inf. Bull.*, Nos. 52/53 (May 1977), pp. 70–78] were accepted.

2. Dr. EGAN informed the meeting that in the absence of Prof. PILZ, Mr. LUXON had accepted his invitation to take the Chair for the Air Quality Commission meetings; and Dr. TROBISCH had agreed to act similarly for the Water Quality Commission meeting in the absence of Dr. WAGNER.

3. Dr. EPSTEIN presented his report on the evaluation of the programme of the Division. This was discussed and, following further comment from Corresponding Members, accepted. On the proposal of Dr. LANGLYKKE it was agreed that a further, similar review by Corresponding Members should be conducted in 1978/79, in time for the 30th IUPAC General Assembly. The Corresponding Members would be invited, in consultation with the Commission Chairmen concerned, to adopt a critical attitude and should where desirable (again in consultation with Chairmen) invite the views of outside experts on individual projects. The following Corresponding Members were appointed for 1977–79.

| | |
|-----------------------------|-------------------|
| Air Quality | Dr. H. EGAN |
| Fermentation | Dr. K. VAS |
| Food | Prof. D. REYMOND |
| Oils, Fats and Derivatives | Drs. H. J. VOS |
| Pesticides | Dr. H. FREHSE |
| Reclamation of Solid Wastes | Dr. K. KOJIMA |
| Water Quality | Dr. S. FREYSCHUSS |

Chairmen of Commissions would also be requested to provide Dr. MARCUSE with revised project details by 30 October 1977 and to send to Prof. SUOMALAINEN an interim report on the progress of the work of their Commission by 10 April 1978.

4. Dr. EGAN reported that, as announced at the Open Meeting, Drs. VOS, Dr. VAS, Dr. LANGLYKKE and Dr. KOJIMA were appointed to the Committee for 1977–81. Since the final date for nominations he had received proposals for Dr. S. I. SAKADYNSKII (USSR) and Dr. P. CLEMENT

(France) and it was agreed that these, together with Dr. M. KAMEL (Egypt) who had been proposed following the meeting of Divisional Presidents with members of the International Company Associates Group, should be invited to accept coopted membership.

5. Dr. EGAN reported that whilst Dr. EPSTEIN and he had only been able to attend the meetings of the Interdivisional Committee on Nomenclature and Symbols, he had again discussed the question of trivial names and had agreed to compile a list of current sources of these. He proposed to resign from this Committee. It was agreed that Dr. EPSTEIN should continue to represent the Division together with one other representative to be appointed after consultation with Prof. SUOMALAINEN.

6. Dr. EGAN circulated details to date of the arrangements for the Joint International Symposium on the Harmonization of Collaborative Analytical Studies, to be held at the Royal Society in London on 9–10 March 1978. About 15 international organizations had been invited and were expected to attend, together with about eight observers from selected national organizations having a strong interest in the subject.

7. Dr. EGAN circulated copies of the Divisional Guidelines prepared by Prof. SUOMALAINEN and explained that these were not intended to be rigid rules. The guidelines were adopted but it was recognized that they should continue to be kept under review in the light of future development.

8. It was agreed that Dr. KOJIMA should be invited to act as liaison for the Division with the Section on Clinical Chemistry and that Dr. EGAN should act as liaison member for the Analytical Chemistry Division.

9. Dr. EGAN reported that he had by invitation attended the meeting of the International Company Associates Group where a proposal for more formal participation as a Standing Committee on Chemistry and Industry had been discussed. He had reported on Divisional matters of interest.

10. Dr. EGAN reported that during the past year, with Dr. ROTH (President-Elect, Section on Clinical Chemistry) he had discussed IUPAC interests with Dr. DIETERICH and others in the World Health Organization in Geneva. It was hoped that as a result there would be closer liaison between WHO

and IUPAC, particularly as regards chemical interests in relation to WHO Expert Committees.

11. Dr. MARCUSE reported that there was a strong and continuing interest between IUFOST and IUPAC, particularly through the Coordinating Committee on Food Chemistry. It was agreed that Prof. REYMOND should act as liaison member for IUPAC and that arrangements for a second joint meeting on 'The Contribution of Chemistry to Food Supplies' under the CHEMRAWN label should be encouraged.

12. Dr. EGAN reported that, following discussions with ICAG, in which interests in marine chemistry were suggested, he had contacted the ICSU Scientific Committee on Oceanic Research (SCOR) and as a result had arranged for Dr. COLLINGS to attend the 1976 Joint Oceanographic Assembly in Edinburgh to represent IUPAC views. Dr. COLLINGS had met the Executive of SCOR and had proposed a liaison correspondence network between the programmes of the two Organizations. This had now been discussed with the Presidents of IUPAC Divisions concerned. It was agreed that Dr. COLLINGS should now initiate this liaison and that it should be recommended that further liaison with SCOR should be through Mr. HAMILTON and the Commission on Water Quality. It was also agreed to recommend continued IUPAC representation, at least in a corresponding capacity, on ICSU Scientific Committee on Water Research (COWAR). Dr. EGAN also reported that, at the request of Dr. CAIRNS he had represented IUPAC at the meeting of the Executive Committee of ICSU Scientific Committee on Problems of the Environment (SCOPE) earlier in the year. Relationships with CODATA, IUNS, IAWPR and EEC were also discussed briefly.

13. In a discussion of matters raised by the Commissions, Dr. FREHSE asked about flexibility of financial budgets. Dr. EGAN replied that, subject to broad conformation to approved estimates, he thought that Chairmen should have maximum freedom to use their financial allocations to the best effect. It was agreed to recommend a change in name for the Commission on Air Quality to the Commission on the Atmospheric Environment; and the Commission on Food Additives to the Commission on Food Properties.

14. Dr. EGAN referred to earlier IUPAC proposals for a Division of Health and Environmental Chemistry, based in part on the programme of the Applied Chemistry Division. This had been discussed by an *ad hoc* Committee under the Chairmanship of Prof. SMETS (of which he had been a member) but no recommendations had been made. Following further discussion, the Committee agreed that a subcommittee under the Chairmanship of Dr. LANGLYKKE should be appointed to review projects and to indicate: (i) those which are of applied chemistry interest; (ii) those which could be considered for transfer, or for joint study; (iii) neglected areas; and to propose projects of industrial or environmental interest in relation to these.

The following membership was proposed: Dr. LANGLYKKE (Chairman), Dr. J. W. BARRETT, Dr. H. EGAN, Dr. H. FREHSE, Dr. B. W. ROSSITER and Prof. K. I. SAKADYNSKII. The subcommittee would report in June 1978 to Prof. SUOMALAINEN who would prepare a report for IUPAC Executive Committee by 15 July 1978. This, together with the results subsequently of the 1978-79 project evaluation (minute 4) would also be available for further consideration at the 30th IUPAC General Assembly in 1979.

15. Dr. EGAN referred to his Report on the work of the Division, which had previously been circulated to all members; and said that this would be the basis of his report to Council later in the week. A provisional budget for 1978 had been received based on actual expenditure in 1976 plus 20%; this would be discussed with Prof. SUOMALAINEN in conjunction with the financial estimates of Commissions.

16. It was agreed that the Committee should meet again in 1978, probably in or about the first week in June. Chairmen of Commissions would also be invited to attend but financial support for this was unlikely to be available.

17. In closing the meeting Dr. EGAN thanked the Polish Academy of Science for the excellent arrangements which had been made for the meetings in Warsaw. He also expressed his special thanks to Dr. A. J. COLLINGS, who had acted as Secretary of the Division for 4 years; and his good wishes for the future of the Division.

Present: Dr. H. EGAN (President), Dr. A. LANGLYKKE, Dr. W. STOLL (Vice-Presidents), Dr. J. EPSTEIN, Dr. H. FREHSE, Dr. A. J. COLLINGS, Dr. S. FREYSCHUSS, Dr. R. MARCUSE (Division Committee), and by invitation Prof. A. RUTKOWSKI, Dr. E. GRZYWA (Polish Academy of Science).

Joint Meeting of Division Committee and the Chairmen and Secretaries of Commissions

Meeting: 12 and 16 August 1977

1. Dr. EGAN, Divisional President welcomed members to the meeting. He regretted that the President-Elect, Prof. H. SUOMALAINEN had been prevented from attending on account of illness: it was Prof. SUOMALAINEN's wish that Dr. A. LANGLYKKE be appointed Vice-President, Dr. R. MARCUSE as Secretary and they would be taking part in the meeting in Warsaw.

2. The minutes of the joint meetings held in Madrid 2 and 5 September 1975 (see *Comptes Rendus 28th IUPAC Conference: Part B*, pp. 297-298) were accepted. Dr. EGAN commented that the revision of the Statutes and Byelaws had led to only relatively minor difficulties and that steps had been taken to resolve these.

3. Dr. EGAN stated that it was important that at

the Warsaw meetings all Commissions reviewed progress and made firm proposals for continued programmes and membership.

4. Dr. EGAN reminded the meeting that in March 1977 IUPAC Executive Committee had recommended via the Bureau to Council that the Titular membership of the Food Commissions should be reduced to 12 in 1977 and to 8 in 1979, that a similar reduction in size should be considered for the Pesticide Commissions and that consideration should also be given to a possible merger of the Air Quality and Water Quality Commissions. Dr. MARCUSE and Dr. KOJIMA, whilst regretting this action, indicated that the two Food Commissions would be making arrangements for the 1977 reduction but that it would be necessary to retain 16 Associate Members for the present. The two present Commissions and a Coordinating Committee for Food Chemistry would continue until 1979 and that Prof. REYMOND had agreed to Chair the Coordinating Committee for the next 2 years. Dr. EGAN commented that the Air and Water Quality Commissions would now be discussing more active programmes and should not for the present merge although further consideration of this might be appropriate in 1979. In the absence of Prof. PILZ, who had resigned for health reasons, Mr. LUXON had agreed to Chair the meetings of the Air Quality Commission in Warsaw; and Dr. TRÖBISH had agreed to take the Chair of the Water Quality Commission in the absence of Dr. WAGNER. Dr. VOS encouraged members to face the problems of mergers; these had been presented to the Oils and Fats Commission and had been overcome.

5. Dr. EPSTEIN reported that he had completed the project evaluation for 1977 with the help of the Corresponding Members. Dr. EGAN commented that this had been a most useful exercise but that in future the Committee would like to introduce a more critical approach to the evaluation. It was now proposed that projects should again be evaluated in 1978/79 by the Corresponding Members of the Divisional Committee, in time for the 30th General Assembly in 1979. The Corresponding Members would then be invited, in consultation with the Commission Chairmen concerned to adopt where appropriate a critical attitude; and where desirable (again in consultation with Chairmen) invite the views of outside experts on individual projects. Commission Chairmen were requested to provide Dr. MARCUSE with revised project details by 30 October 1977 and to send to Prof. SUOMALAINEN by 10 April 1978 an interim report of the progress of the work of Commissions, Working Groups, etc. In reply to Dr. VOS, Dr. EGAN said that it was desirable, but not essential, that Working Groups should be Chaired by a Titular or Associate Member of a Commission.

6. Dr. EGAN reminded the meeting that in 1975 a proposal had been made to create a new Division on Environmental and Health based on the Applied Chemistry Division. IUPAC President-Elect Prof. SMET had subsequently Chaired an *ad hoc* Committee to consider this at which the views of the

Section on Clinical Chemistry and the Commission on Medicinal Chemistry had also been discussed. No conclusions had been reached. The Division Committee had also discussed the proposal and recognized the need to provide a further focus for environment and industrial interests within IUPAC. It had therefore been decided to appoint a subcommittee, under the Chairmanship of Dr. LANGLYKKE to review projects and to indicate: (i) those which are of applied chemistry interest; (ii) those which could be considered for transfer, or for joint study; (iii) neglected areas; and to propose new projects of industrial or environmental interests in relation to those. The subcommittee would report in June 1978 to Prof. SUOMALAINEN, who would prepare a report for IUPAC Executive Committee by 15 July 1978. This, together with the result subsequently of the 1978/79 project evaluation already mentioned, would also be available for further consideration at the 30th IUPAC General Assembly in 1979.

7. Dr. EGAN thanked Commission Chairmen for the way in which the budgets had been met. It had been his policy to give each Commission Chairman control over his allocation of funds. Final Commission estimates for 1978 should be submitted to Dr. MARCUSE by 15 September 1977 and any new programme diversifications specially noted, since this might attract additional funds if a Divisional claim could be made in October 1977.

8. Mr. EDWARDS expressed concern of the Pesticides Commission on the problems of getting their material published. Dr. EGAN replied that this was a recognized problem throughout IUPAC and one being actively pursued by the Publications Committee at the present meetings when it was hoped that a solution would be reached.

9. Dr. EGAN thanked Chairmen and Secretaries of Commissions for their support during his 4 years as Division President and wished them and the Division well in the future.

Present: Dr. H. EGAN, Dr. W. STOLL, Dr. R. MARCUSE, Dr. H. FREHSE, Dr. S. FREY-SCHUSS, Dr. A. F. LANGLYKKE, Prof. D. REYMOND, Dr. D. TONKS, Dr. K. HILL, Dr. A. J. COLLINGS, Dr. J. A. EPSTEIN (Applied Chemistry Division Committee), Dr. J. C. HOOGERHEIDE, Prof. A. HUMPHREY, Prof. C. PAQUOT, Dr. H. J. VOS, Dr. E. O. HAENNI, Dr. K. KOJIMA, Dr. A. E. WASSERMAN, Dr. K. OHNO, Dr. L. COLES, Dr. B. SCHATZ, Dr. P. C. KEARNEY, Mr. M. J. EDWARDS, Dr. R. GREENHALGH, Dr. R. C. POLLER, Prof. S. J. PIRT, Mr. S. G. LUXON (Commission Chairmen and Secretaries).

Division Open Meeting

16 August 1977

1. The meeting was opened by Dr. EGAN, President of the Applied Chemistry Division in the presence

of over 50 members of the Division. Dr. EGAN told the meeting that Prof. SUOMALAINEN, President-Elect of the Division, was unable to attend due to ill health. Good wishes were expressed for Prof. SUOMALAINEN's early recovery.

2. The meeting stood in silence to the memory of Dr. Ch. RESNICK who died suddenly early in the year.

3. The minutes of the open meeting held in Madrid on 5 September 1975 (see *Comptes Rendus 28th IUPAC Conference: Part B*, pp. 428–430) were accepted. There were no matters arising.

4. Dr. EGAN informed the meeting that the postal ballot for members had been carried out as agreed at the last open meeting. There had been five nominations for four vacancies but the untimely death of Dr. RESNICK, one of the nominees, made further action unnecessary. Consequently, Drs. KOJIMA, LANGLYKKE, VAS and VOS had been appointed to the Division Committee. Prof. SUOMALAINEN would take over as President. Dr. LANGLYKKE was appointed Vice-President, Dr. MARCUSE as Secretary and Dr. EGAN, Past President. The ICAG had expressed an interest in coopted membership and had suggested the name of Dr. M. KAMEL of Egypt. In addition, a nomination by Prof. EMANUEL of Prof. SAKADYNSKII (USSR) had been received, but after the final date for the postal ballot; and a similar proposal by Prof. QUIVORON for Dr. P. CLEMENT (France) had also been received. Dr. EGAN said that he would invite Dr. CLEMENT, Dr. KAMEL and Prof. SAKADYNSKII to join the Committee as coopted members. Dr. EGAN thanked members of the Division Committee, the outgoing Divisional Secretary, the Chairmen and members of the Commissions for their support during his 4 years as President of the Division. Dr. COLLINGS proposed a vote of thanks to Dr. EGAN for his work over the past 4 years. This was approved with acclamation.

5. The Report of the Divisional President had been circulated to members prior to the meeting and the President drew the attention of the members to a number of points. Prof. SUOMALAINEN had prepared draft guidelines for the running of the Division and the election of members of the Division Committee and of the Commissions. Copies were distributed for information and comment.

6. Dr. EGAN referred to the Joint Meeting on the Symposium 'Harmonization of Collaborative Analytical Chemistry' which would be held in London 9–10 March 1978. Attendance would be by invitation only.

7. Dr. EGAN reminded the meeting that the first IUPAC/CHEMRAWN Conference would be held in Toronto 10–13 July 1978. Great interest had also been expressed in the possibility of a later CHEMRAWN Symposium on 'The Contribution of Chemistry to Food Supplies' possibly jointly with IUFOST and perhaps in 1980/81 and in a developing country.

8. The Division Committee had evaluated the projects of the Commissions in 1977. This would be done again in 1979. The role of Corresponding members would be extended, in consultation with Commission Chairmen, to include a critical evaluation of individual projects, in consultation where appropriate with other, independent authorities in the field.

9. Dr. EGAN reminded the meeting of the US proposal in 1975 for a new Division on Health and Environmental Chemistry based largely on the work of the Applied Chemistry Division. Prof. SMETS, President-Elect of the Union, had called together an *ad hoc* Committee to consider this but had made no recommendations. This had also been considered by the Division Committee which had, in consequence, decided to conduct an internal review under the Chairmanship of Dr. LANGLYKKE to review all the projects in the Division with a view to identifying those of industrial and environmental interest; to identify neglected areas and (where appropriate) to propose new projects; and to identify projects which could be considered for transfer.

10. On the invitation of the President, the Chairmen of Commissions [Dr. HAENNI, Dr. KOJIMA, Prof. HUMPHREY, Dr. VOS, Dr. KEARNEY, Dr. FREHSE, Mr. LUXON (for Prof. PILZ), Dr. FREYSCHUSS (for Dr. WAGNER) and Prof. PIRT] reported briefly to the meeting on the work of the Commissions, all of which now had full active programmes. Drs. HAENNI, KOJIMA and MARCUSE expressed concern at the recommendation earlier by the Executive Committee for a reduction in Titular membership of the Food Commissions from 16 to 12; this would mean a reduction in activity, although this could be minimized if the Associate membership remained at 16 for the time being. Dr. FREHSE also commented on the reduction of projects in the Pesticides Commissions in preparation for a reduction later in Titular membership. Dr. EGAN thanked the Chairmen for their reports, especially welcoming the election earlier to the Division of Drs. KOJIMA and VOS.

11. Commissions were requested to provide Dr. MARCUSE with copies of minutes of their meetings, and full details of their projects by 30 October 1977. Chairmen were requested to present an interim progress report to Prof. SUOMALAINEN by 10 April 1978.

COMMISSION ON FOOD ADDITIVES* (VI.1)

Meeting: 13–16 August 1977

1. *Minutes of Previous Meeting.* Minutes of the meeting in Paris (France) in September 1976 were adopted.

2. *Reorganization.* It was concluded that the Commission should (i) agree to reduce its Titular membership to six, (ii) oppose proposed immediate

*See pp. 125–127 for joint meetings.

amalgamation of the Food Additives and Food Contaminants Commissions, (iii) take a strong stand against any further reduction in the food programme, (iv) request additional Associate memberships beyond six under Byelaw 4.302, (v) change its name to Commission on Food Properties to reflect planned diversification beyond the food additives area, and (vi) establish a system of 'working groups' for its project work to permit enlistment of qualified workers outside IUPAC in furtherance of the programme.

3. Membership. Retirement of Drs. MARCUSE and WASSERMAN reduced the Titular membership to six. Resignation of Dr. KAUFFMAN and transfer of Prof. BILLEK to the Commission on Food Contaminants reduced the continuing Associate membership to three. It was decided to reappoint Associate Members Mr. WALKER and Mr. McDONALD and to appoint retiring Secretary Dr. WASSERMAN as an Associate Member. The Chairman's proposal to appoint Mr. DODGEN as Secretary was approved.

4. Status of Work Programme. Names of project leaders are indicated in parentheses. Interlaboratory study demonstrated a number of methods for volatile nitrosamines determination in foods to be adequate for inclusion in a manual of selected analytical methods for environmental carcinogens to be published by IARC (Mr. WALKER). A survey of methods for non-volatile nitrosamines indicating the greater difficulty of their determination is to be published. Also, a preliminary investigation showed the feasibility of a collaborative study of methods for three significant nitrosoamino-acids in a food matrix (Dr. KUBACKI). Studies have progressed on determination of protein-bound nitrite to permit establishment of sample preparation techniques for optimal results in analysis for nitrite in meats (Dr. WASSERMAN). A procedure for *N*-heterocyclic aromatic carcinogens was developed and applied to establish occurrence of eight *N*-heterocyclics in cabbage extracts in Germany (Prof. GRIMMER). It is being extended to analysis of smoked meat and smoked fish. Available methods of adequate scope for simultaneous determination of a number of antioxidants in food will be circulated for comment preparatory to establishment of a collaborative study (Dr. KUBACKI). Work will continue on methods for determination of urethane in beverages (Dr. BALTES) and on evaluation of residues in edible products from treated livestock (Dr. COFFIN).

5. Programme Extension. Working groups with the indicated coordinators are to be established on the following projects: food colorants (Mr. WALKER); control of purity of food additives (Mr. SCHATZ); quality factors for meat and for fish (Dr. WASSERMAN); and rapid methods of food analysis (Mr. SCHATZ). It was further proposed to organize a group on protein (quality) analysis of food and possibly one on individual seed analysis.

6. Publications. Publications now in process include a survey of methods for individual antioxidants,

recommended methods for polycyclic aromatic hydrocarbons in meats and in oils, and a survey of artificial sweeteners.

Present: Dr. E. O. HAENNI (Chairman), Dr. R. MARCUSE (Vice-Chairman), Dr. A. E. WASSERMAN (Secretary), Prof. G. GRIMMER, Dr. S. J. KUBACKI, Prof. M. NIKONOROW, Mr. B. A. SCHATZ (Titular Members), Dr. M. BERGSTRØM-NIELSEN, Mr. E. A. WALKER (Associate Members), Prof. D. REYMOND (Corresponding Member, Division Committee), Dr. W. HAUSHEER (Switzerland), Dr. T. KATO (Japan) (Observers and Prospective National Representatives).

COMMISSION ON FOOD CONTAMINANTS* (VI.2)

Meeting: 13–15 August 1977

1. Minutes of Previous Meeting. The Commission reviewed and approved the minutes of the meeting in Paris on 13–15 September 1976 and other related papers.

2. Membership. As a result of the request of the Executive Committee, the Commission decided to reduce the number of Titular Members from eight to six, but to keep eight Associate Members for 1977–79. Then Dr. K. KOJIMA* (re-elected as the Chairman), Dr. L. E. COLES (elected as the Secretary), Dr. A. D. CAMPBELL*, Dr. M. JEMMALI, Dr. P. KROGH and Mr. M. V. TRACEY were proposed as Titular Members, and Prof. G. BILLEK**, Prof. F. BRO-RASMUSSEN, Dr. H. GUTHENBERG, Dr. W. KRÖNERT, Dr. J. D. LITTLEHAILES*, Dr. K. OHNO**, Dr. P. L. SCHULLER** and Dr. P. S. STEYN* as Associate Members (*re-elected, **elected). Prof. JUSZKIEWICZ and Dr. LANGE were approved as National Representatives.

3. Publications. The following were published during 1976–77: (i) Technical Report No. 14: Recommended Methods for Ochratoxin A and B in Barley. (ii) Proceedings of 2nd International Symposium on Mycotoxins held at Pulawy on 23–25 July 1974, in *Zeszyty Problemowe Postępów Nauk Polniczych*, No. 189. (iii) Proceedings of the 3rd IUPAC Symposium on Mycotoxins in Foodstuffs, held in Paris on 16–18 September 1976, in *Pure and Applied Chemistry*, Vol. 49, No. 11 (invited lectures), in a special issue of *Annales de la Nutrition et de l'Alimentation* (CNRS) (occurrence, bioproduction, toxicity, mode of action, metabolism), and in a special issue of *Archives Institut Pasteur de Tunis* (prevention, detoxification).

4. Cooperation with Other International Organizations. Activities of the Commission in which cooperation with ISO, FAO, WHO and UNEP was involved, especially relating the mycotoxin problem, were reported.

5. Work Programme 1976–77. The results of the activities of each project were discussed, and it was

*See pp. 125–127 for joint meetings.

agreed that the following projects would be continued in 1977–78. The on-going projects are given hereunder, with the names of their coordinators in parentheses:

(i) Collection of Information on Food Contaminants derived from Food Packaging (Prof. BILLEK). (ii) Multi-mycotoxin Analysis (Dr. STEYN). (iii) Determination of Lead and Cadmium in Food (Drs. SCHULLER and COLES). (iv) Determination of Copper in Food (Dr. SCHULLER). (v) Determination of Selenium in Food (Dr. COLES). (vi) Single Cell Protein (Drs. LITTLEHAILES, OHNO). (vii) Mycotoxin Formation during Shipment of Foodstuffs (Dr. CAMPBELL). (viii) Sampling Plans for Mycotoxin Analysis (Dr. CAMPBELL). (ix) Method of Determination for Aflatoxin M₁ in Dairy Products (Dr. SCHULLER). (x) The Determination of Tin in Food (Dr. COLES). (xi) Marine Toxins as Contaminants of Seafoods (Dr. KROGH). (xii) A Compilation of IUPAC Recommended Methods for Determination of Mycotoxins and Other Informations (Drs. CAMPBELL, KROGH). (xiii) Specifications on Mycotoxin Analytical Standards (Drs. SCHULLER, STEYN). (xiv) Mycotoxin Residues in Food of Animal Origin (Dr. JEMMALI *et al.*).

The following projects were discussed and it was decided that the work of the Commission in relation to the projects had been completed: (i) Detoxification of Mycotoxin-contamination Foodstuffs. (ii) Mini-column Methods for Mycotoxins. (iii) Determination of Mercury in Food.

6. Future Projects. The following were discussed as future projects: (i) 4th IUPAC Symposium on Mycotoxins and Seafood Biotoxins. (ii) Determination of Ochratoxin Residues in Meat. (iii) Use of Animal Waste for Animal Feed. (iv) Fluoride in Food. (v) Trace Metals in Feed. (vi) Determination of Mycotoxins by HPLC.

Present: Dr. K. KOJIMA (Chairman), Dr. K. OHNO (Secretary), Dr. A. D. CAMPBELL, Dr. L. E. COLES, Dr. M. JEMMALI, Dr. P. KROGH, Dr. P. L. SCHULLER (Titular Members), Prof. G. BILLEK, Prof. P. BRO-RASMUSSEN, Dr. A. J. COLLINGS, Dr. J. D. LITTLEHAILES, Dr. W. KRÖNERT, Dr. P. S. STEYN (Associate Members), Prof. T. JUSZKIEWICZ (National Representative, Poland).

Coordinating Committee on Food Chemistry (CCFC)

Meeting: 13–16 August 1977

1. The meeting mainly had to discuss the future structure of the contributions of IUPAC to the solution of world-wide problems in food chemistry. In 1975 a new structure for IUPAC interests in food chemistry had been developed, including two Commissions (VI.1 and VI.2) with a Coordinating Committee on Food Chemistry. While being engaged with establishing this new structure, members of the Commissions VI.1 and VI.2 had been confronted with a request for a new change of structure,

ultimately aiming at one-commission-representation ('amalgamation') of IUPAC interests in the field of food chemistry. Considering the broad spectrum, the large magnitude and the particular importance of food chemistry problems and the world-wide expectations towards IUPAC in this regard from the part of industry and national as well as international organizations, such one-commission-representation was regarded as not acceptable, the more since food as the most important part of human environment deserves the highest attention. As a compromise, however, a reduction of the number of Titular Members from eight to six was accepted in order to contribute to the need of lowering costs in IUPAC.

2. A new membership of the Coordinating Committee was agreed upon, including Prof. D. REYMOND, member of the Division Committee, as Chairman, and Mr. B. A. SCHATZ, Titular Member of VI.1, as Secretary, and the Chairmen and Secretaries of VI.1 and VI.2 as members, as well as some coopted members.

3. During the period to be discussed, i.e. the years 1975–77, one of the main tasks of CCFC had been regarded to be handling of new projects in the field of food chemistry outside the present areas of the two Commissions VI.1 and VI.2 for future coordination to the structure of food chemistry as represented in IUPAC. Such items were purity requirement of food additives, chemical methods for the control of edible quality of meat and fish and rapid methods for food analysis.

4. In order to enable the existing commissions on food to include such items into their programme, it was agreed to propose renaming of Commission VI.1 from Commission on Food Additives to Commission on Food Properties.

5. Another task of the Committee had been coordination of work going on in the two commissions on food, VI.1 and VI.2, coordination of this work with similar interests of other IUPAC commissions and cooperation (liaison) with other international organizations such as ISO, IUFOST, JECFA (FAO/WHO) and IUNS.

6. Closing the meeting Dr. MARCUSE left IUPAC Commissions on Food Chemistry after 10 years of service and handed over the Chairmanship of CCFC to Prof. REYMOND.

Detailed minutes of the meeting are available from the Commission Secretary.

Present: Dr. R. MARCUSE (Chairman), Mr. B. A. SCHATZ (Secretary), Dr. A. J. COLLINGS, Dr. E. O. HAENNI, Dr. K. KOJIMA, Dr. K. OHNO, Dr. A. E. WASSERMAN (Members). Prof. M. BERGSTRØM-NIELSEN, Prof. G. BILLEK, Mr. F. BRO-RASMUSSEN, Dr. A. D. CAMPBELL, Dr. L. E. COLES, Prof. G. GRIMMER, Dr. M. JEMMALI, Dr. P. KROGH, Dr. W. KRÖNERT, Dr. S. J. KUBACKI, Dr. J. D. LITTLEHAILES, Dr. E. LÜCK, Prof. M. NIKONOROW, Prof. D. REYMOND, Dr. P. L. SCHULLER, Dr. P. S. STEYN, Mr. E. A. WALKER (Observers).

COMMISSION ON FERMENTATION (VI.3)

Meeting: 13–16 August 1977

1. *Minutes of Previous Meeting.* The minutes of the meeting held in Berlin, 27 June and 1 July 1976 were read and agreed as a true record.

2. *Membership.* Prof. A. E. HUMPHREY was elected Chairman (to 1979), Dr. R. C. RIGHELATO was elected Secretary (to 1981), Prof. T. K. GHOSE, Dr. C. COONEY, and Prof. C. CASA-CAMPILLO were elected Titular Members (to 1981), Dr. J. C. HOOGHEIDE, Dr. J. ZAJIC and Prof. H. T. BLACHERE were elected Associate Members (to 1981). The following members were confirmed as continuing for their period of office to 1979: Prof. H. DELLWEG (Vice-Chairman), Prof. J. HOLLO, Dr. K. YAMADA, Dr. V. K. EROSHIN, Prof. A. FIECHTER, Prof. S. J. PIRT and Prof. G. TAKAHASHI. The following were recommended as National Representatives: Mr. W. K. BRONN (Federal Republic of Germany), Ing. H. WUTZEL (Austria), Prof. B. P. RALPH (Austria), Dr. M. LINKO (Finland), Dr. O. ILNICKA (Poland), Dr. R. J. ERTOLA (Argentina).

3. *International Fermentation Symposia (IFS).* A report on the 5th IFS (Berlin) had been prepared. The organizing committee of the 6th IFS to be held at London, Ontario, had raised US-\$120000 from Industry to support the Symposium. The meeting place will be the Holiday Inn. The Indian Academy of Sciences agreed to 7th IFS being held in India in 1984—the Department of Science and Technology (India) had been approached for their approval and a reply was awaited.

4. *Methods for Determining the Fermentation Power of Baker's Yeast.* A report of the study done under the auspices of ICC and the IUPAC Fermentation Commission was presented by FP. The report compared three methods and their variability within and between laboratories. The report was discussed and some concern expressed at the between laboratory variation. The Commission unanimously endorsed the following: (a) the report be accepted by the Commission, (b) ICC be encouraged to communicate the results to all interested parties, (c) with the agreement of ICC the results should be published as an IUPAC technical bulletin, (d) work should continue to improve the precision of the recommended method.

5. *Standards for Protein of Microbial Origin.* The subcommittee put before the Commission a proposed technical report 'Single cell protein based on methanol' and a revised draft of one section entitled 'II Toxicological and nutritional evaluation'. A revised draft will be circulated early in 1978. The preparation of a status report on SCP processing to produce purified and processed SCP for human use was proposed. The aim would be to identify the methods of processing with a view to establishing standards relative to human use. An initial report to educate the Commission on such processing will be prepared for September 1978.

6. *Recommended Terms and Symbols.* The Commission had received the report from Mr. W. K. BRONN and suggestion from Prof. S. J. PIRT, Dr. V. K. EROSHIN and Prof. AIBA. A motion from Prof. A. E. HUMPHREY that a small meeting be held in the near future to produce a final list was carried. The meeting would consist of Mr. W. K. BRONN (Chairman), Prof. S. J. PIRT, Prof. A. E. HUMPHREY, Dr. R. C. RIGHELATO with one or two coopted advisers. A list of items and symbols was discussed. A final list will be prepared early in 1978.

7. *Cellulose as a Resource for the Fermentation Industry.* The Commission felt that an expanded brief would increase the value of this contribution to IUPAC activities. The subject area should be expanded to cover the contribution of microbiology to the use of renewal energy and chemical sources. It was suggested that the project title be changed to e.g. 'Microbial technology in the provision of energy and chemicals from renewable resources'. The objective of the project would be to provide a source of information on existing and potential technology and to indicate useful research areas.

8. *Future Commission Meetings.* The next Commission meeting was scheduled for 2–3 September 1978 at Munich with the IAMS meeting.

Present: Prof. A. E. HUMPHREY (Chairman), Prof. H. DELLWEG (Vice-Chairman), Dr. R. C. RIGHELATO (Secretary), Prof. J. HOLLO, Dr. K. YAMADA (Titular Members), Dr. V. K. EROSHIN, Dr. J. C. HOOGHEIDE, Dr. F. PARISI, Prof. S. J. PIRT (Associate Members), Dr. R. J. ERTOLA, Dr. O. ILNICKA, Dr. A. F. LANGLYKKE, Ing. H. WUTZEL (National Representatives).

COMMISSION ON OILS, FATS AND DERIVATIVES (VI.4)

Meeting: 13–16 August 1977

1. *Minutes of Previous Meeting.* The previous meeting was held in Lyngby (Denmark) from 8 to 11 June 1976. The 'Procès-Verbal des réunions de Lyngby' had been distributed to Members by IUPAC Secretariat on 9 September 1976. These minutes were adopted.

2. *Membership.* Mr. S. CHRISTENSEN, Mr. B. GULBRANSON, Dr. H. HADORN, Prof. A. JAKUBOWSKI and Mr. D. REYNOLDS have resigned their functions in the Commission. The Members approved the nomination as National Representatives by the relevant Adhering Organization of Prof. M. M. CHAKRAVRATY (India), Mr. U. ENGELRUD (Denmark), Prof. V. KAPOULAS (Greece), Dr. A. KARABATUR (Turkey), Dr. T. NAGAI (Japan), Dr. G. ZWERENZ (Austria) and Prof. W. ZWERZYKOWSKI (Poland).

According to the new Statutes and Byelaws of IUPAC, the list of the Titular and Associate Members is modified (see *Membership Lists of IUPAC*

Bodies: 1977–79, pp. 163–166). The designated officers for the period 1977–81 are Prof. C. PAQUOT (France) as Chairman and Dr. A. HAUTFENNE (Belgium) as Secretary, and for the period 1977–79 Prof. E. DELVAUX as Vice-Chairman.

3. *Chairman's Report.* The Chairman summarized the problems pending between the Commission and Applied Chemistry Division Committee and their solutions. The name of our Commission on Oils and Fats will be changed into Commission on Oils, Fats and Derivatives, as accepted by the IUPAC Executive Committee at its 87th meeting; the Bureau will be asked to recommend Council to approve this change at Warsaw. The Chairman gave information on the difficulties caused by the establishment of the new composition of our Commission, notably because the number of the Associate Members will be reduced from 12 to 10 in 1977, and from 10 to 8 in 1979, and because it is necessary that we have only one National Representative for each country. At the end of his Report, the Chairman gave a summary on the contacts between our Commission and the other international organizations dealing with the chemistry of fats and derivatives, notably in the field of standardization of methods of analysis.

4. *Work Programme 1976–77.* The results of the activities of the Working Groups (WGs) were discussed, and it was agreed that all the WGs, except WG 10 (which has finished its task) continue their Work Programme 1977–78. These WGs are given hereunder, with the names of their Chairmen in parentheses:

WG 2: Determination of total oxidized fatty acids by TLC and densitometry (Prof. M. NAUDET)

WG 3: Determination of tocopherols (free and esterified) in oils, fats, margarine, etc. (Drs. P. HENDRIKSE)

WG 4: Determination of chlorinated pesticides in oils, fats, . . . (Prof. E. DELVAUX)

WG 5: Determination of the content of *cis-cis* linoleic acid in oils, fats, margarine, etc. (Dr. Ö LEVIN)

WG 6: Determination of the oil content in oil seeds by NMR techniques (Dr. J.-P. WOLFF)

WG 7: Report on changes taking place in oils and fats during deep fat frying (Prof. H. WESSELS)

WG 8: Identification and determination of emulsifiers (derived from fatty material) in oils, fats, fat products, cosmetics, etc. (Dr. H. BRÜSCHWEILER)

WG 11: Determination of total fat in margarine (Prof. M. NAUDET)

WG 12: Determination of plastic polymers in oils and fats (Drs. J. van der WEEL)

WG 13: Determination of undesirable plastic-based contaminants (other than polyethylene) in oils and fats (Dr. Ö. LEVIN)

WG 14: Revision of the method II.D.5. 'Determination of the unsaponifiable matter' (Prof. M. NAUDET)

WG 15: Revision of the method II.D.1. 'Determination of the acid value' (Drs. H. VOS)

5. *Work Programme 1977–78.* In addition to the above-mentioned WGs, it was decided to develop the achieved programme of the WG 10. The creation of two new WGs was recommended:

WG 16: Determination of glycerines (Mr. A. MØLLER)

WG 17: Determination of alkaline soaps (Dr. H. BRÜSCHWEILER)

The programme of these two WGs is the preparation of the corresponding texts for the 6th Edition of our Methods.

It was also decided to study the determination of erucic acid in oils containing this acid (rape seed oil, hydrogenated fish oils, etc.). A new WG was also established.

WG 18: Determination of erucic acid (Prof. H. WESSELS).

6. *Publications.* The Secretary gave the following information: (i) The 4th Supplement to the 5th Edition of *Standard Methods for the Analysis of Oils, Fats and Soaps*, containing 19 methods, is actually in press by Pergamon and will be out of press in a few months. (ii) A 6th Edition of these methods is in preparation by WG 9, with revised texts. The Section I (Oleaginous seeds and fruits) and Section II (Oils and Fats) will be published in English by Pergamon, probably within 2 years. A French translation is also in preparation.

7. *Date and Place of Next Meeting.* The Belgian delegation invited the Commission to meet at Louvain-la-Neuve (near Brussels) from 29 August to 1 September 1978. Detailed minutes, under the title 'Procès-Verbal des réunions de Varsovie' will be distributed to Members by IUPAC Secretariat.

Present: Drs. H. VOS (Chairman), Prof. C. PAQUOT (Secretary), Dr. H. BRÜSCHWEILER, Prof. E. DELVAUX, Dr. D. FIRESTONE, Dr. J. GRACIAN TOUS, Mr. A. MØLLER (Titular Members), Prof. T. ASAHARA, Prof. M. NAUDET, Prof. A. RUTKOWSKI, Prof. H. WESSELS (Associate Members), Dr. D. CHOBANOV, Dr. A. DIEFFENBACHER, Mr. U. ENGELRUD, Mr. B. McGWYNNE, Dr. T. HASHIMOTO, Dr. A. HAUTFENNE, Mlle. B. JACOBSBERG, Prof. V. KAPOULAS, Mme. E. KURUCZ, Dr. Ö. LEVIN, Mme. E. LEWKOWITSCH, Dr. T. NAGAI, Dr. R. OHLSON, Dr. J. POKORNÝ, Dr. K. WILLIAMS (National Representatives), Prof. H. CHAVERON, Dr. A. GREVE, Mme. K. MADZELEWSKA, Prof. H. NIEWIADOMSKI, Prof. W. ZWERZYKOWSKI (Observers).

COMMISSION ON AIR QUALITY (VI.5)

Meeting: 13–16 August 1977

1. Mr. LUXON opened the meeting by saying that due to the illness of Prof. PILZ, Chairman of the Commission, and the resignation of Dr. DROPE, Secretary, Dr. EGAN (Division President), had asked him to take the chair. Dr. COLLINGS offered

to take the minutes. The Commission had to provide in Warsaw: (a) a paper for the Division Committee justifying its existence, (b) full details of the proposed programme, (c) details of the revised membership.

2. History of Commission. Prof. TRUHAUT reviewed the history of the Commission and reminded the Members that much of the work done in the past had not yet been published. It was recognized that with the increasing interest in occupational health and hygiene every effort should be made to bring the work to a stage where the information could be published and made available.

3. Future Work Programme. Mr. LUXON's paper laying down the role of the Commission was discussed. It was agreed that the work programme should cover three broad areas: (a) global atmospheric chemistry, (b) environmental air quality—where the air is polluted by one or more point sources, (c) in-house air quality—monitoring of the working environment.

Detailed discussions were held ranging over various aspects of global atmospheric chemistry. It was recognized that there were three areas of interest: The effects of combustion products on atmospheric quality—this was already being considered in depth with the Economic Commission for Europe (ECE) of WHO. The latter was a very active group, already in close liaison with Mr. LUXON. It was agreed that the liaison was of great benefit to IUPAC and that encouragement would be given for ECE to approach IUPAC in analytical problems.

Global carbon dioxide presented very difficult monitoring problems. It was thought that IUPAC should not yet become involved, but should regularly review programmes with a view to initiating action at the appropriate time.

Photochemical changes in the upper atmosphere induced by the presence of fluorocarbons, nitrogen oxides, sulphur oxides, etc., was an area where it was considered that IUPAC should make a positive contribution. At the moment none of the Commission Members was well qualified to develop this important part of the programme. It was agreed that Dr. A. P. ALTSHULLER (USA) should be invited to become a Titular Member.

4. Existing Programme. It was considered that the existing programme covered the areas of general and working environmental air quality and it was subjected to critical review and consequent extension to ensure that the programme would be viable and cover all the fields indicated above. The following projects were agreed: Critical assessment of methods for the analysis of (i) benzene in air, (ii) asbestos in air, (iii) vinyl chloride monomer in air, (iv) nitrosamines in air, as well as (v) problems of fluorocarbons in the stratosphere, (vi) general air sampling strategy, (vii) critical review of determination of isocyanates in air, (viii) review of the existing IUPAC standards for detector tubes, (ix) compilation of permissible limits for air contaminants.

In order to further involve industry in certain of the projects the Commission recommended that two subcommittees be set up: one on 'Standardization of Methods for Benzene in Air' and a similar one

for Asbestos. Membership of these subcommittees would be drawn from industrial interests on a wide geographical basis.

5. Responsibilities of Chemists for Environment. It was recognized that this aspect of a chemist's education was sadly lacking and it was agreed to refer the matter to the Committee on Teaching of Chemistry.

6. Liaison with Company Associates. Since the programme would be of direct interest to many industrial concerns it was agreed to send descriptions of the various projects to the Chairman of ICAG for distribution to and for comments from Company Associates.

7. Liaison with other IUPAC Bodies. Mr. LUXON commented that the expertise in many of the IUPAC Commissions, in particular in the Analytical Chemistry Division, might be asked for, say, for comment on the suitability of various end-point detection methods used in air quality analysis. Also, there was much common interest with the Commission on Toxicology.

8. Liaison with International Agencies. Mr. LUXON had received all papers from ISO TC/146 concerning air quality. Dr. FUGAS offered to review the papers on environmental aspects, Mr. LUXON on monitoring and instrumentation, Dr. COLLINGS on in-house measurements, and Mr. LEICHNITZ any general papers. Mr. LUXON would continue liaising with the ECE on combustion, and Prof. TRUHAUT and Dr. FUGAS agreed to liaise jointly with the appropriate body in the WHO concerned with photochemical oxidants, oxides of nitrogen, and environmental health criteria for carbon monoxide. Prof. TRUHAUT agreed to report to the Commission on the activities of SCOPE.

9. British National Committee for Chemistry (BNCC). Mr. LUXON reported that BNCC had outlined several areas where IUPAC involvement was desirable, such as transfer and deposition of materials in the environment, photochemical and biological effects. It was agreed that the revised programme covering several of these aspects be made available to BNCC.

10. Liaison with Commission on Toxicology (CToCC). Many of the activities of CToCC, such as their project on determination of substances in biological fluids, would overlap with the work of the Air Quality Commission. A useful joint meeting had been held and it was agreed to sponsor jointly the programme on the occupational health of nickel, to exchange minutes, and to hold another joint meeting in 1979.

Report of the Joint Meeting (15 August). The meeting agreed that there was a need for closer liaison between the two Commissions. It was agreed that the subcommittees on toxicity and occupational health of nickel and cadmium should be jointly sponsored by the two Commissions and the Commission on Air Quality was asked to nominate

members to coordinate the work on the monitoring of nickel and cadmium and the total and chemical, physical form for nickel in the working environment. The meeting noted the need to concentrate on the various aspects of chemistry involved in occupational health, and should work in areas where there were needs for regulation and standardization. The Commissions passed useful comments on each others programme and it was agreed that liaison should continue in general and in specific areas.

11. Membership. The three remaining Titular Members were re-elected and Mr. LUXON appointed Chairman. Two new Titular Members were elected: Dr. A. J. COLLINGS (UK, also to act as Secretary) and Mr. K. LEICHNITZ (FRG). The Chairman would contact Dr. A. P. ALTSHULLER (USA) and if willing to take an active part in the Commission, he would be proposed as a Titular Member subject to the postal approval of Members. Concerning Associate Membership, the Chairman would write to several persons suggested to enquire as to what contribution they could make to the programme to be followed by postal election.

12. Name of Commission. The Commission Members recommended to the Applied Chemistry Division Committee that the Bureau be asked to change the name of the Commission to Commission on the Atmospheric Environment.

13. Next Meeting. The next meeting of the Commission would be on 27–29 September 1978 in Lübeck at the invitation of Mr. LEICHNITZ.

Present: Mr. S. LUXON, Prof. R. TRUHAUT, Dr. M. FUGAS (Commission on Air Quality); Dr. A. J. COLLINGS (Applied Chemistry Division Committee); Mr. K. LEICHNITZ (by invitation).

COMMISSION ON TERMINAL PESTICIDE RESIDUES (VI.6)

Meeting: 13–16 August 1977

1. Minutes of Previous Meeting. The minutes of the meeting held at Dernbach, Federal Republic of Germany, 13–18 September 1976 were adopted.

2. Membership. By request, the tenures of Drs. DEKHUIJZEN and MAYR were not renewed. Drs. BEYNON, DESMORAS and VONK were appointed as new Associate Members for the period 1977–79.

3. Pesticide Congresses. Arrangements for the Fourth International Congress of Pesticide Chemistry, Zürich, 24–28 July 1978 are on schedule. The final selection of submitted papers will take place in early 1978. The need for greater use of the poster sessions was stressed. The Coordinating Committee gave approval in principle to hold the 1982 Congress in Japan.

4. Future of the Commission. Following a directive from the Executive Committee, the Commission reluctantly agreed to merge with Commission on Pesticide Residue Analysis in 1979. Simultaneously, the Titular membership will be limited to a total of 12, with the possibility of a further reduction to 8 by 1981. The office of Corresponding Member for the Applied Chemistry Division Committee, now held by Dr. FREHSE will also terminate in 1979.

5. Project Assignments. Reviews of the metabolism of the organochlorine, organophosphorus, carbamate and pyrethroid insecticides and ethylene bisdithiocarbamates, ETU, ethylene oxide and methyl bromide will be discontinued on a yearly basis. Future emphasis will be on in-depth reports covering critical environmental and pesticide problems and the definition of pesticidal terms.

Current assignments are: (i) International Congress of Pesticide Chemistry, Zürich, 1978—Dr. GEISSBÜHLER; (ii) Pesticidal Nitrosamines—Drs. KEARNEY, BEYNON, DRESCHER and MIYAMOTO; (iii) Chlorophenols—Drs. CROSBY, BEYNON, STILL and VONK; (iv) Toxaphene—Drs. KORTE and KEARNEY; (v) Definition, Persistence—Drs. BARON, DESMORAS, ENGST and GREENHALGH.

The 1978 project reports should reach the Chairman by the 20 May, in order that they may be distributed to members for comment well in advance of the meeting. Only those reports submitted before the deadline will be considered at the meeting.

6. Project Reports. Technical reports on the chemistry and metabolism of carbamate and organophosphorus pesticides, ETU and dithiocarbamates were presented to the Commission. Progress on the special reports covering Toxaphene, chlorophenols, pesticidal nitrosamines, terminal residue definition was reviewed. The chlorophenol report was restructured.

7. Publications. The special report on ETU has been published in *Pure Appl. Chem.* **49**, 675–689 (1977). Dr. KEARNEY will provide Commission VI.7 members with three copies each. In the absence of any definitive action by the Committee on Publications, the minutes and project reports presented at Dernbach will be published in JAOAC.

8. Next Meeting. The Commission will meet next in Limburgerhof, Federal Republic of Germany, 17–21 July 1978.

Present: Dr. P. C. KEARNEY (Chairman), Dr. R. GREENHALGH (Secretary), Dr. R. L. BARON, Prof. R. ENGST, Dr. H. GEISSBÜHLER, Prof. F. KORTE (Titular Members), Dr. K. BEYNON, Dr. J. DESMORAS, Dr. N. DRESCHER, Dr. G. G. STILL, Dr. J. W. VONK (Associate Members), Mr. J. A. R. BATES, Dr. V. BATORA, Mr. M. J. EDWARDS, Dr. H. FREHSE, Dr. M. A. KLISENKO, Dr. P. A. GREVE (CODEX), Dr. K. R. HILL, Mr. I. S. TAYLOR, Dr. H. P. THIER, Dr. E. E. TURTLE (FAO), Dr. S. L. VITOROVIC and Dr. G. WIDMARK (Observers).

COMMISSION ON PESTICIDE RESIDUE ANALYSIS (VI.7)

Meeting: 13–16 August 1977

1. *Minutes of Previous Meeting.* The minutes of the meeting held at Dernbach, Federal Republic of Germany, 13–18 September 1976 were adopted.

2. *Membership.* The death of Dr. Ch. RESNICK (Associate Member) was noted with deep regret. Dr. FREHSE, Dr. HILL and Dr. WIDMARK were not eligible for re-election. Membership for 1977–79 is Mr. M. J. EDWARDS (Chairman), Mr. J. A. R. BATES (Secretary), Dr. V. BATORA, Dr. R. A. GREVE, Dr. M. A. KLISENKO, Dr. S. GORBACH (Titular Members), Mr. S. B. HEUSER, Mr. I. S. TAYLOR, Prof. H. P. THIER, Dr. L. S. VITOROVIC (Associate Members).

3. *Future of the Commission.* The Chairman discussed the recommendations of the IUPAC Executive Committee, that the Pesticide Commissions be amalgamated. It is proposed that they will merge to form a single Pesticide Commission which will meet in 1979 with 12 Titular and 12 Associate Members, and a possible further reduction to 8 Titulars and a minimum of 8 Associates by 1981. Members reluctantly agreed, but noted the adverse effect of such a reduction upon Commission projects.

4. *Publications.* Concern was expressed that the Minutes and Project Reports of the 1976 Meeting and in particular the Technical Reports on Recommended Methods of Analysis had not yet been published by IUPAC. It was hoped that help from IUPAC Secretariat would resolve this. In the meantime it was expected that the minutes and Project Reports would be published in JAOAC.

5. *Project Reports.* Reports on methods of residues analysis for organochlorine and organophosphorus pesticides, fumigants, carbamate insecticides, fungicides, ethephan and 2,4-D were reviewed. Technique reviews were presented on liquid and gel permeation chromatography, gas chromatography, non-chromatographic separations and confirmatory tests. Progress was reviewed for the special projects on extractability of residues, the reliability and interpretation of data and the influence of post-application factors.

6. *Project Assignments.* It was agreed that annual general reviews of methods for pesticide groups would not continue. Future projects would concentrate on the presentation of important topics in Residue Analysis, status reports on methodology and responses to specific requests from CCPR for analytical methods.

Current assignments are: (i) Extractability of Residues—M. J. EDWARDS, S. G. HEUSER, M. A. KLISENKO; (ii) Reliability of Residue Data—J. A. R. BATES, S. GORBACH; (iii) Identity of Residues—P. A. GREVE; (iv) Importance of Metabolites—H. FREHSE; (v) Status Report on Clean-up Procedures—H. P. THIER; (vi) Status Report on Determination Procedures (I. S. TAYLOR); (vii) Confirmatory Techniques—P. A.

GREVE); (viii) Simple Methods of Analysis—V. BATORA, M. A. KLISENKO, S. Lj. VITOROVIC; (ix) CCPR + Compound Reviews.

The 1978 project reports should be sent to the Secretary by 1 June 1978 for advance distribution to members. Following the procedure agreed for the Warsaw meeting, only those reports submitted on time will be considered at the meeting.

7. *CCPR Recommendations.* In future the Secretary and Dr. P. A. GREVE would identify those Commission Members, to whom copies of the CCPR list of Compound/Crop Combinations would be sent, for their comments about specific compound methods. This procedure would be kept under review.

8. *Any Other Business.* Agreed that liaison with the Commissions on Oils and Fats (VI.4), Food Additives (VI.1) and Food Contaminants (VI.2) would continue via the arranged Joint Meetings and exchange of minutes.

9. *Next Meeting.* The Commission will next meet in Limburgerhof, Federal Republic of Germany, 17–21 July 1978.

Present: Dr. H. FREHSE (Chairman), Mr. M. J. EDWARDS (Secretary), Dr. V. BATORA, Dr. P. A. GREVE (also representing CCPR), Dr. K. R. HILL (also representing AOAC), Dr. M. A. KLISENKO, Prof. G. WIDMARK (Titular Members), Mr. J. A. R. BATES, Dr. S. GORBACH, Mr. I. S. TAYLOR, Prof. H. P. THIER, Dr. S. Lj. VITOROVIC (Associate Members). The following attended by invitation, Dr. ENGST and Dr. VONK (Commission VI.6), Dr. E. E. TURTLE (FAO) and Dr. R. J. WHITEOAK (Observer under the Wates-IUPAC Bursary Scheme).

Coordinating Committee on Pesticide Chemistry (VI.6 and VI.7)

Meeting: 13–17 August 1977

1. *Minutes of Previous Meeting.* The minutes of the last meeting of the Coordinating Committee held in Dernbach, FRG, on 13–18 September 1976 were adopted.

2. *Membership.* Members noted with regret the death of their colleague Dr. Ch. RESNICK. Dr. HILL and Dr. WIDMARK have resigned from Commission VI.7, Mr. J. A. R. BATES, new Secretary for Commission VI.7 will be a member, Dr. J. MIYAMOTA sent apologies.

3. *Future of Commissions.* The Committee, after considering the IUPAC Executive Committee proposals, agreed that the present Commissions VI.6 and VI.7 should combine into a single Pesticides Commission in 1979 with a total of 12 Titular Members and 12 Associate Members. A further reduction of members to 8 Titular and a minimum of 8 Associates is the target for 1981 meetings.

4. *Publications.* Concern was expressed on the unsatisfactory situation regarding the publication of the work of the Pesticide Commissions. There was some reassurance from IUPAC Executive Secretary that the problems would be resolved and the Secretaries of both Commissions were requested to pursue this matter urgently. Dr. KEARNEY advised that JAOAC would probably publish suitably presented project papers and the Commission Secretaries were asked to submit these to him.

5. *Project Reports.* The Committee supported a proposal by Dr. KEARNEY, that a Commission member not submitting a project report for 2 consecutive years be asked to resign.

6. *Pesticide Congresses.* The Committee received a progress report from Dr. GEISSBÜHLER on the arrangements for the 1978 Congress in Zürich. The Committee agreed to support the proposal from the Pesticide Science Society of Japan and the Japanese Material Committee for Chemistry to hold the 5th International Congress of Pesticide Chemistry in Japan in 1982. Dr. FREHSE would respond to the proposers and IUPAC Secretariat would be asked to obtain the necessary formal approval of IUPAC via the Bureau.

Dr. KEARNEY agreed to write to IUPAC Secretariat on his discussions with Dr. HORSFALL (Chairman of Standing Committee which organizes the Plant Protection Congress) on future coordination of the Plant Protection Congress and the Pesticide Congress. He felt further discussion would not be useful but emphasized the need to maintain the principle of ensuring separate congress topics.

7. *Cooperation with IUPAC Commissions.* Liaison with the Commissions on Oils and Fats (VI.4), Food Additives (VI.1) and Food Contaminants (VI.2) would continue via the joint meetings arranged at Warsaw.

8. *International Liaison and Representation.* The Committee recognized the importance of liaison between the Commissions and the various international organizations with a strong interest in pesticides, particularly in analysis and residues. The liaison consists mainly of exchange of relevant minutes and papers and mutual invitations to be represented at meetings. The Commissions liaise with EEC, FAO, WHO, CCPR and JMPR, OECD, EPPO, IAEA, CIPAC, COMECON, AOAC and ISO.

9. *Any Other Business.* The Analytical Chemistry Division have recommended the formation of a subcommittee to identify areas of environmental and industrial interest in IUPAC.

10. *Date and Place of Next Meeting.* The Coordinating Committee will next meet in Limbergerhof, Federal Republic of Germany, 17–21 July 1978.

Present: Dr. H. FREHSE (Chairman), Dr. P. C. KEARNEY (Vice-Chairman), Mr. M. J. EDWARDS (Secretary), Dr. V. BÁTORA, Dr. H.

GEISSBÜHLER, Dr. R. GREENHALGH, Dr. K. R. HILL, Prof. G. WIDMARK (Titular Members). Dr. E. E. TURTLE (FAO representative) attended by invitation.

Joint Meeting of Commissions on Terminal Pesticide Residues (VI.6), Pesticide Residue Analysis (VI.7), Food Additives (VI.1) and Food Contaminants (VI.2)

Meeting: 16 August 1977

1. *Organization.* Plans for the joint meeting had been prepared in advance by exchange of information on the participating Commissions' activities. Dr. P. C. KEARNEY was Chairman of the joint meeting with Mr. B. A. SCHATZ as Secretary.

2. *Report of Commission VI.1.* Dr. HAENNI, Chairman of the Commission on Food Additives, presented the programme of Commission VI.1, including nine projects, most of them related to the possible presence of carcinogenic substances in foods or food additives.

3. *Report of Commission VI.2.* Dr. KOJIMA, Chairman of the Commission on Food Contaminants, presented projects of the Commission VI.2, likely to be of common interest to the participating Commissions, namely Trace Metals in Food, Determination of Selenium, Studies on Mycotoxins, Contaminants Derived from Food Packagings, Single Cell Proteins, and Marine Toxins.

4. *Report of Commissions VI.6 and VI.7.* Dr. KEARNEY and Dr. FREHSE presented those projects of Commissions VI.6 and VI.7, which were of common interest, namely Toxaphene and Cyclo-dienes, Carbamates, Organophosphates, Nitrosamine Compounds, and ETU-Dithiocarbamates.

5. *Items of Mutual Interest.* The method on ETU-determinations will be sent to Commissions VI.1 and VI.2. Information regarding nitrosamine compounds will be exchanged between Dr. KEARNEY and Mr. WALKER. Information about the determination of tin in organotin compounds will be exchanged between Dr. GORBACH and Dr. KOJIMA.

Present. Commission VI.6: Dr. P. C. KEARNEY (in the Chair), Mr. B. A. SCHATZ (Secretary), Dr. R. GREENHALGH, Dr. R. L. BARON, Prof. R. ENGST, Dr. H. GEISSBÜHLER, Prof. F. KORTE (Titular Members), Dr. K. BEYNON, Dr. J. DESMORAS, Dr. N. DRESCHER, Dr. G. G. STILL, Dr. J. W. VONK (Associate Members). Commission VI.7: Dr. H. FREHSE, Mr. M. J. EDWARDS, Dr. V. BÁTORA, Dr. P. A. GREVE, Dr. K. R. HILL, Dr. M. A. KLISENKO, Prof. G. WIDMARK (Titular Members), Mr. J. A. R. BATES, Mr. I. S. TAYLOR, Prof. H. P. THIER, Dr. S. L. VITOROVIC. Commission VI.1: Dr. E. O. HAENNI, Dr. A. E. WASSERMAN, Prof. G. GRIMMER, Dr. S. J. KUBACKI, Dr. R. MARCUSE, Prof. M. NIKONOROW (Titular

Members), Prof. W. BALTES, Prof. M. BERGSTRØM-NIELSEN, Prof. G. BILLEK, Mr. E. A. WALKER (Associate Members), Dr. E. LÜCK (National Representative). Commission VI.2: Dr. K. KOJIMA, Dr. K. OHNO, Dr. A. D. CAMPBELL, Dr. L. E. COLES, Dr. M. JEMMALI, Dr. P. KROGH, Dr. P. L. SCHULLER (Titular Members), Mr. F. BRO-RASMUSSEN, Dr. A. J. COLLINGS, Dr. W. KRÖNERT, Dr. J. D. LITTLE-HAILES, Dr. P. S. STEYN (Associate Members), Prof. D. REYMOND (Applied Chemistry Division Committee).

Joint Meeting of Commissions on Analytical Reactions and Reagents (V.1), Food Additives (VI.1) and Food Contaminants (VI.2)

Meeting: 14 August 1977

1. Report of Commission VI.1. Dr. HAENNI, Chairman of the Commission on Food Additives, presented the programme of Commission VI.1 including nine projects, most of them related to the possible presence of carcinogenic substances in foods or food additives.

2. Report of Commission VI.2. Dr. KOJIMA, Chairman of the Commission on Food Contaminants, presented projects of the Commission VI.2 supposed to be of particular interest to the participating Commissions, namely Determination of Trace Metals in Food, Determination of Selenium, Determination of Contaminants Derived from Food Packagings.

3. Report of Commission V.1. Prof. PELLERIN (Commission of Analytical Reactions and Reagents) then presented the programme of Commission V.1, namely, Identification and Determination of Polyphenolic Compounds, Determination of Traces of Pb, Cd, Zn and Cu in Organic Substances, Determination of Traces of Organostannic Compounds in Food Packagings, Fluorimetric and Colorimetric Determination of Steroids.

4. Liaison between the Commissions. The reports showed several activities of V.1 on one side and VI.1 and VI.2 on the other to be of overlapping character. It was agreed that there is a need for closer liaison between the Commissions and it was decided as follows: (i) Lists of current projects and new project proposals should be exchanged by the secretaries for information. (ii) Early information on planned collaborate studies should be given, inviting members of other Commissions to participate.

Present: Commission V.1: Prof. R. BELCHER (in the Chair), Mr. B. A. SCHATZ (Secretary), Dr. A. HULANICKI, Prof. J. INCZEDY, Mr. F. J. REIDINGER (Titular Members), Prof. G. ACKERMANN, Prof. F. PELLERIN (Associate Members), Prof. S. B. SAVVIN (National Representative). Commission VI.1: Dr. E. O. HAENNI, Dr. A. E. WASSERMAN, Prof. G. GRIMMER, Dr. R.

MARCUSE, Prof. M. NIKONOROW (Titular Members), Prof. M. BERGSTRØM-NIELSEN, Prof. G. BILLEK, Mr. E. A. WALKER (Associate Members). Commission VI.2: Dr. K. KOJIMA, Dr. K. OHNO, Dr. L. E. COLES, Dr. P. L. SCHULLER (Titular Members), Mr. F. BRO-RASMUSSEN, Dr. W. KRÖNERT, Dr. P. S. STEYN (Associate Members), Prof. D. REYMOND (ACDC), Dr. W. HAUSHEER, Dr. T. KATO (Observers).

COMMISSION ON WATER QUALITY (VI.8)

Meeting: 13–14 August 1977

1. Membership. Prof. R. WAGNER (FRG), Dr. K. TROBISCH (FRG) and Dr. P. H. SCHWEITZER (FRG) are now Chairman, Vice-Chairman and Secretary respectively. Full details of the existing and future membership of the Commission have been published in *Membership Lists of IUPAC Bodies: 1977–1979*, pp. 177–178 (Pergamon Press, Oxford, 1978).

2. Programme of the Commission. The Commission has discussed the proposed merging of the Commissions of Air Quality and of Water Quality. The Commission felt that while close cooperation with the Air Quality Commission is appropriate, the need to bring in-depth technical expertise to the future programme makes it necessary to maintain a separate identity for the two groups. The Commission reviewed the present programme and made suggestions for future projects as follows:

(i) *Water Pollution Abatement in Industry.* Following the successful Congresses in Stockholm in 1970 and 1975, sponsored by IUPAC, the Commission discussed the idea of a follow-up meeting in 1980 and believed this to be timely. The topics to be covered would include: (a) low waste technologies; (b) waste water recycling; (c) waste water treatment. Dr. FREYSCHUSS will find out if the Congress could be arranged in Stockholm and will report to the Commission at its next meeting in 1978. At that time details of the programme should be developed, preferably with an input from the Reclamation of Solid Waste Commission.

(ii) *Microbiological Aspects of Effluent Treatment.* Developments in microbiological sciences and increasing use of biological effluent treatment makes it even more important to bring together the relevant experts in a symposium originally proposed for 1977. Dr. GRAU has indicated that he is continuing his efforts to arrange this meeting in Prague. He is asked to give a progress report in time for the Commission meeting in 1978. Dr. GRAU should also contact Prof. HUMPHREY of the Commission on Fermentation.

(iii) *Nomenclature in Water Chemistry.* The Commission felt that there is a need for a better definition of many of the terms used in water chemistry and for guidance in the use of words such as biodegradation, persistence, bioaccumulation and toxicity. The Members shall make comments following Prof. WAGNER's letter of 1 June 1977. These comments

should reach Prof. WAGNER by 31 December 1977, so that he may be able to present an intermediate report for the next meeting.

(iv) *Education in Water Chemistry*. This project could be regarded as part of the project of the Commission on Fermentation on 'Education in Biochemical Engineering'. Prof. WAGNER should discuss his thoughts with Prof. FIECHTER, who is the coordinator of this project.

(v) *ISO TC/147: Water Quality*. Dr. BETHGE is asked to continue the liaison and to give the Commission Members a review of the work concerning ISO TC/147. The Commission asks him particularly to advise if ISO is considering any work connected with continuous monitoring of water quality.

(vi) *COWAR*. The Commission awaits an opportunity to review COWAR's new terms of reference after its re-organization. This will enable the Commission to determine the best way for future contacts with this important group. The IUPAC Executive Secretary is asked to circulate the needed information as soon as it becomes available.

3. *Future Projects*. The Commission discussed possible future projects. The following projects were formulated: (vii) Present state of development of processes for treating industrial waste water; (viii) Possible future trends of industrial waste water treatment. Dr. TROBISCH as coordinator will prepare preliminary papers. It is intended to circulate the paper on project (vii) before the 1978 meeting and to discuss project (viii) during that meeting.

Other matters which were discussed and agreed to fall within the scope of the Commission's activity are the following: (a) Automatic monitors for water pollutants. (b) Better methods for determining traces of toxic organic substances. (c) Environmentally desirable chemical reactions occurring through mixing of different effluent streams. (d) Harmonization of procedures of water analysis. (e) Effects of surface run-off to ocean water quality. The Members of the Commission are encouraged to consider these subjects, so that a detailed discussion at the next meeting can possibly lead to a clear identification of projects.

4. *Next Meeting*. The next meeting is scheduled to take place in Frankfurt-am-Main (FRG) in February or March 1978 and will last 2 or 3 days. The 1978 meeting is considered to be of special importance for the future work of the Commission, because it was not possible to have a meeting in 1976.

Present: Dr. K. TROBISCH (Acting Chairman), Dr. S. FREYSCHUSS (Titular Member), Dr. J.

LEMLIN (Observer), Dr. J. E. EPSTEIN (Corresponding Member).

COMMISSION ON RECLAMATION OF SOLID WASTES (VI.9)

Meeting: 17 August 1977

1. The minutes of the previous meeting of the Commission held in Berlin in 1976 were approved.

2. It was agreed that the 10 papers presented at the Conference organized by the Commission, which had just concluded in Warsaw, together with the salient points in the discussions should be published as soon as possible. These papers have identified the solid waste problems and thus achieved the first objective of the Commission.

3. It was agreed that an urgent request be sent to the Chairman of the Applied Chemistry Division to expand this small Commission in view of the very large number of problems and areas for further work which had emerged during the Conference. Providing that the individuals named are willing to act, then Dr. L. G. LINDFORS of Sweden should be made a Titular Member with Dr. T. MATSUZAKI (Japan) and Dr. I. ZANDI (USA) as Associate Members. If Dr. C. ROLZ of Guatemala can influence his country to join the Union, then he should be appointed as an additional Associate Member.

4. The main future work of the Commission would come under the heading 'International Problems of Solid Waste Reclamation'. This work will involve the critical evaluation and dissemination of information on present practice of solid waste reclamation. Efforts will be made to stimulate research work particularly in certain critical areas such as microbial digestion of cellulose and polymer degradation—by publication of facts, articles, information etc. In addition to strictly scientific work, the members of the Commission will be drawing attention to fiscal, economic and social practices in many countries which stimulate recycling of scarce resources.

5. The next meeting of the Commission will be in September 1978 in London during Prof. HUMPHREY's visit to Europe.

Present: S. J. PIRT (Chairman), R. C. POLLER (Secretary), A. E. HUMPHREY (Titular Member).
Observers: R. C. RIGHELATO, F. PARISI, H. DELLWEG, A. F. LANGLYKKE, H. NESS, L. G. LINFORS, C. ROLZ, T. MATSUZAKI.

REPORTS OF IUPAC BODIES

IUB-IUPAC JOINT COMMISSION ON BIOCHEMICAL NOMENCLATURE (JCBN)

Meeting at Lübeck (FRG): 13–15 June 1977

1. Organization. The meeting was the first one of JCBN. It met jointly, as it intends to in future, with the Nomenclature Committee of IUB (NC-IUB) with whom it has four members in common (the four appointed by IUB). Prof. KARLSON is Chairman of both committees, and Dr. DIXON was asked to be Secretary of both. The two bodies succeed the previous IUB-IUPAC Commission on Biochemical Nomenclature. They expressed the intention of conferring widely with other relevant bodies, both of editors and nomenclators, to try to obtain wide backing for recommendations. JCBN will be more concerned with metabolites and natural products and NC-IUB with enzymes, but the two intend to work jointly on most topics.

2. Enzyme Nomenclature. Dr. JAKOBY reported on the work done to publish a new edition of the list of enzymes. Arrangements were made for its checking and publication.

3. Iron-Sulfur Proteins. A draft was considered for a document on the nomenclature of these proteins. It was referred back to the expert panel with some suggestions.

4. Enzyme Activity. The naming of this quantity (previously agreed by CBN) was confirmed, and arguments were approved against naming it 'catalytic ability'. The application for official listing of the katal as an SI unit was considered, but NC-IUB and JCBN decided neither to support nor oppose this. A document was approved for publication subject to consultation with other bodies.

5. Other Topics. The nomenclature of the following was considered: Carbohydrates (conformational analysis, unsaturated monosaccharides, branched-chain monosaccharides), Polysaccharide conformation, Polynucleotide conformation, Vitamin D, Vitamin E, Tetrapyrroles, Lipoproteins, Catecholamines, Multi-enzyme complexes, Enzyme kinetics. In each case a working party is being established if it is not already at work.

6. Compendium of Rules. The plans of the *European Journal of Biochemistry* to publish, in response to an invitation from IUB, a compendium of nomenclature rules were discussed in detail and warmly welcomed.

7. Next Meeting. This will be held jointly with the Committee of Editors of Biochemical Journals in Washington in June 1978 (dates later corrected to 9–13 June).

Present: P. KARLSON (Chairman), C. LIÉBECQ, B. LINDBERG (nominated by IUB), H. B. F. DIXON, Y. JEANNIN, W. KLYNE, K. L. LOENING (nominated by IUPAC), Other Members of NC-IUB: W. B. JAKOBY, B. KEIL, E. C. WEBB, Observers: E. C. SLATER (IUB), R. DYBKAER (IUPAC Section on Clinical Chemistry).

MACROMOLECULAR DIVISION WORKING PARTY ON STRUCTURE AND PROPERTIES OF COMMERCIAL POLYMERS

Meeting at Marl (FRG): 24–26 August 1977

1. Molecular Theories in Polymer Rheology. Prof. LODGE gave comments on his interim report and particularly on the four criteria he suggested for recognizing a good molecular theory. Volunteers to review existing theories were asked to give literature references of the theory, to list its assumptions and predictions, to list the obscure points and to comment on the theory in the light of the criteria of the report. The reviewers would send a report to Prof. LODGE before 31 December 1977, who would make a digest of it to be discussed at the next meeting. Prof. LODGE proposed to lead a subgroup not only composed of members of the Working Party which would meet independently. Prof. LODGE would report to the Working Party on the activity of his group.

2. Rheology of Block Copolymers. The first draft of the final report was presented by Mr. A. GHIJSELS and Dr. van der VEGT. It was proposed that the findings on the influence of the duration of strain on relaxation should be published separately. Individual comments on the report (particularly on the 'discussion') should be sent to the coordinator who will then circulate the new conclusions and recommendations for continuation of the programme.

3. Morphology. Mr. COGSWELL commented on the present status of the programme and the following future work was proposed: (i) To try to establish the nature of basic particles in emulsion polymer; compounding would be tried by Borg Warner; Solvay would try with a PVC of low K-value. (ii) Hüls would send amorphous samples to participants. (iii) A study of the change in dimensions of basic particles to be carried out. (iv) To follow structure modification by small-angle X-ray scattering at

high temperature. (iv) To find out which factors influence the dimensions of particles group. The preliminary report would be issued at the end of October 1977, short studies might be done before the end of this year.

4. PE Film-Blowing

(i) *LDPE Samples*. Dr. WINTER presented the status of the programme. Behaviour in elongation seemed to be definitely correlated to film blowing performance. IKT could measure velocity profile and force intensity when blowing the film; these measurements should be duplicated by another laboratory. Mechanical and optical tests on films would be carried out at least by Montedison and ICHP on two sets of samples. Dr. WINTER will set out the programme.

(ii) *HDPE Samples*. The programme is not so advanced but mechanical and optical tests should also be carried out by the same laboratories. RRC would use its rheogoniometer if it works properly.

5. *New Programmes*. Members were asked to think of future programmes and to send propositions to the Secretary before the end of March 1978. He will then circulate the list of the propositions which the members will rank in order of interest.

6. *Membership*. It was noted that membership implies effective participation to at least one programme and also attendance at meetings: one every other year for members interested in only one programme is a minimum.

7. *Next Meeting*. At the invitation of ICI Plastics Division the next meeting devoted to rheology will be held on 3–4 July 1978 at Welwyn Garden City.

8. *New Sponsored Group*. Macromolecular Division Committee has decided to sponsor a group of 15 people headed by Dr. A. MICHEL (CNRS Lyon, France) concerned with a study of the relationship between molecular defects in PVC and thermal and photochemical degradation. This group will be controlled by our Working Party to which Dr. MICHEL will report.

Present: Dr. G. AJROLDI, Dr. M. E. CARREGA, Dr. J. CHAUFFOUREAUX, Dr. P. L. CLEGG, Mr. F. N. COGSWELL, Mr. H. COSTER, Mr. A. GHIJSELS, Prof. A. S. LODGE, Prof. J. MEISSNER, Dr. H. H. MEYER, Dr. A. MÜNSTEDT, Dr. A. PLOCHOCKI, Dr. A. K. van der VEGT, Dr. A. J. de VRIES, Dr. M. H. WAGNER, Dr. J. L. S. WALES, Dr. H. H. WINTER. Prof. J. WHITE attended by invitation.

COMMITTEE ON TEACHING OF CHEMISTRY (CTC)

Meeting at Cassis (France): 13–14 May 1978

Dr. G. DONTSOV. The Chairman, on behalf of the Committee, expressed his deep regret on the death of Dr. George DONTSOV (Division of Science, Technical and Vocational Education, UNESCO). Dr. DONTSOV had been an admired colleague and friend of the Committee.

1. *Composition of the Committee*. The Committee received an up-to-date list of Members and National Representatives. Full details are available in *Membership Lists of IUPAC Bodies: 1977–1979*, pp. 31–34 (Pergamon Press, Oxford: 1978). The Chairman welcomed Profs. R. C. PAUL, J. T. SHIMOZAWA and C. SZANTAY to their first meeting.

2. **Minutes of Previous Meeting and Matters Arising*. Minutes of the previous meeting of the Committee held in Ljubljana, Yugoslavia, 24 and 30–31 August 1977, were approved (for Synopsis minutes see *IUPAC Inf. Bull.* 1978, No. 1, pp. 37–38).

(a) *Continuing Education in Industry*. It was noted that, following Prof. COOK's survey, Dr. J. W. BARRETT, Chairman of the International Company Associate Group, has made the following proposals: (i) IUPAC develops a scheme for placing a few staff of chemistry departments of universities of developing countries in industry of the industrially developed world. (ii) IUPAC develops a scheme for more continuing education for chemists in industry (including agriculture) of developing countries. The Committee felt that these proposals were of considerable interest. However, if proposals for specific funding were considered necessary, it would be important to involve the International Company Associate Group.

(b) *Anthology of Chemical Education*. Prof. LAFITTE reported that a number of articles selected for the Anthology could not be published for reasons of copyright. Further articles will be selected and the Anthology will be sent, in its final form, to UNESCO by 15 September 1978.

(c) *Survey of Chemistry in Developing Countries*. Prof. RAO reported that the survey was published in the *International Newsletter on Chemical Education*, No. 8.

(d) *International Symposium, Ljubljana*. It was reported that Prof. KORNHAUSER was hopeful that the Proceedings would be published in October 1978.

(e) *Resource Bank of Visual Aids for Chemistry Teachers*. The Secretary reported that Dr. CHILDS was preparing the first materials and these would be sent to National Representatives as soon as possible.

3. *Budget for 1978*. Following requests for increased funding, the allocation for the Committee in 1978 is US-\$5000 to cover expenses of the meeting in Cassis. The surplus is available for other activities of the Committee. The Chairman will be raising the question of finance, in the long-term, with the Bureau.

4. *International Newsletter on Chemical Education*. It was reported that *Newsletters* 7 and 8 were published in December 1977 and April 1978, respectively.

**Erratum*: The following typographical mistake in the minutes of meeting at Ljubljana and published in *IUPAC Inf. Bull.* 1978, No. 1 should be corrected:

p. 38, lines 11–14 (L.H. column): item (iv) appearing first should be deleted as the correct item (iv) has been printed immediately after it.

UNESCO has provided funds for *Newsletters* 9 and 10 which will probably be published in July and December 1978. It was noted that one copy of the *Newsletter* is sent, by airmail, to every Member and National Representative. The others are sent to National Representatives by surface mail. Prof. NEWBOLD and Dr. ROBINSON agreed to draft a questionnaire to be sent to National Representatives asking them to obtain further information about readership and the suitability of the present articles, and this evaluation would be helpful in deciding whether to continue to publish the *Newsletter* in its present form.

5. *Chemical Education 1973-77*. Prof. RAO gave a progress report on the book in which new school and tertiary level programmes and programmes in educational research would be considered in order to update our knowledge of the various programmes around the world. National Representatives were being asked to cooperate in writing the text and individuals in 17 other countries were also being asked to contribute.

6. *Proposal for International Symposium in Chemical Education, 1979*. The Secretary reminded the Committee of the background to the proposal. The Royal Irish Academy invited IUPAC CTC and FECS WPCE to hold their next International Symposia on Chemical Education in Dublin in August 1979. Both agreed to accept the invitation and to have a combined Symposium on aspects of the interface between school and university. Further, it was agreed that an informal Working Party should meet in April 1979 prior to full committee meeting of IUPAC CTC and FECS WPCE to produce a draft programme. It was agreed further to ask for suggestions from two members of IUPAC CTS (Profs. SAMUEL and ILLUMINATI), with comments from Prof. GARDNER and from two members of FECS WPCE (Profs. FRAZER and KORNHAUSER). Parallel to this, National Representatives of IUPAC CTC were asked for their comments. The informal Working Party consisted of Profs. FRAZER and KORNHAUSER (FECS WPCE), Prof. ILLUMINATI and the Secretary (IUPAC CTC) and Mr. START (representing the Royal Irish Academy).

Prof. ILLUMINATI and Mr. START took the Committee through the proposals and the following decisions were made: (i) to accept the general format of the content and administrative structure proposed by the informal Working Party; (ii) to request sponsorship of UNESCO, and to invite the International Council of Associations for Science Education (ICASE) to co-sponsor the Symposium.

7. *Problems of Conversion to SI Units and its Effect on Teaching of Chemistry at School Level*. Prof. NEWBOLD pointed out that of the 19 replies, 17 countries had changed to SI units, and that it was apparent that the pupil adapted to SI units more quickly than the teacher. He agreed to (a) write a short report on his survey for *International Newsletter on Chemical Education*, and (b) extend the survey in two ways: to re-survey the secondary level and to extend it to the tertiary level.

8. *Chemical Nomenclature*. It was decided that the request by the Association for Science Education for endorsement of their book *Chemical Nomenclature, Symbols and Terminology* be referred to the appropriate IUPAC bodies dealing with nomenclature.

9. *International Journal of Chemical Education*. It was agreed that copies of the replies from National Representatives be sent to Prof. FRAZER. The Committee did not feel that there was sufficient demand for such a Journal.

10. *Low-Cost Equipment*. The Secretary reported on his discussion with UNESCO. Interest was expressed in the idea of gathering in data of where low-cost equipment was being made and likely demands from individuals, centres, countries, regions.

11. *Chemistry for People*. The Committee considered the replies from National Representatives and noted the divergence of views. It was considered that the Secretary General would appreciate the opportunity to see the replies and a bibliography and sample texts. The Secretary was asked to invite the Secretary General to make specific proposals for any future work that he feels the Committee might usefully do.

12. *Films*. Prof. ILLUMINATI discussed how chemical education films might be more readily exchanged and used. The Chairman reminded the Committee of the resolution on this subject made at the Madrid meeting in 1975. Prof. ILLUMINATI was invited to prepare a paper for the next meeting.

13. *UNESCO Publications*. The Secretary outlined the correspondence he had had with the Director of Publications, UNESCO. A note on how to obtain UNESCO publications is being written within his Department for the *International Newsletter on Chemical Education*. National Representatives are urged to write to the Director himself or to the Secretary of this Committee if there are any difficulties in obtaining information or published materials within their country.

14. *UNESCO University Teaching Programme*. Since the first Laboratory Workshop in Seoul in 1975, IUPAC CTC have been involved in two other meetings, a Workshop in Mexico City in November 1977, for the Latin American and Caribbean Region, and a Congress in Perth, Australia, in February 1978, during which the Chairman gave a keynote address and the Secretary, supported by a panel of speakers, outlined the work accomplished during the Workshops. Main lectures from the Perth Congress have been published in *Pure Appl. Chem.* **50**, No. 6 (1978).

Collaboration with the Committee is proposed for further Workshops, in a project concerned with low-cost equipment and low-cost audio-visual aids. The Secretary has sent detailed proposals to Dr. KINGSTON, based on discussions held in this Committee and in the UNESCO Advisory Panel on Chemistry Teaching held in Perth, Australia, to which he and the Chairman were invited.

Prof. ILLUMINATI was invited to submit a proposal to the Committee on the integration of areas of chemistry teaching (one of the aims, too, of the Laboratory Programme). Following the Dublin meeting, Prof. ILLUMINATI will make proposals for a meeting to discuss the teaching of key subjects.

The Committee will be invited to take part in a Regional Symposium being planned for 1980 and to be held in Africa.

15. UNESCO, Division of Science, Technical and Vocational Education. Mrs. HAGGIS outlined the areas of cooperation existing between her Division and the Committee. An Anthology of Literature was being prepared. She had invited the Secretary to send her detailed suggestions for a book for teachers on the methodology of chemical education, and these were being prepared. Mrs. HAGGIS emphasized the concern felt within her Division for technician training and re-training. She told the Committee of her agreement that the provision of low-cost equipment was a priority area and that she will be sympathetic to proposals.

Mrs. HAGGIS outlined a proposal for an International Meeting on Science Education in 1982, to follow up the work done by the UN Conference on Science and Technology and Development, and that this meeting would include aspects of chemical education. She suggested a small symposium on the case of chemistry in integrated science projects to be held in the 1979–81 biennium.

16. FECS Working Party on Chemical Education. Dr. HOFACKER (Secretary of FECS WPCE) outlined the essential points of interest arising from the meeting of the Working Party in Paris in April 1978. Dr HOFACKER proposed that FECS should send a note about its activities regularly to the *International Newsletter on Chemical Education*. This proposal was greeted with universal approval. The Secretary has been invited by FECS WPCE to attend its meetings and a permanent place on the agenda will be reserved for the dissemination of CTC business.

17. ICSU Committee on Teaching of Science. The Committee received the paper by Prof. TAYLOR (Chairman of ICSU CTS) which was based on his contribution to the conference, of which he was Chairman, on Integrated Science Education Worldwide, held in Nijmegen in March/April 1978. Mrs. HAGGIS said that the conference, co-sponsored, amongst others, by ICSU and ICASE, was a considerable success and its proceedings will be published in the UNESCO New Trends Series.

Following concern at the last CTC meeting and at ICSU CTS, that chemistry was being by-passed in some integrated science programmes, Mrs. HAGGIS suggested that a small symposium on the core of chemistry in integrated science be held in the 1979–80 biennium, following preparatory work that might be done at the Dublin Symposium.

The Secretary outlined some of the activities of ICSU CTS that are of major interest to CTC: (a) the first ICSU CTS *Newsletter* will be published in June 1978 and copies will be sent to Members and National Representatives; (b) a book, edited by Prof. TAYLOR, *New Approaches to Teaching and Learning Strategies in University Science*, will be published by the University of Cardiff Press this year; (c) a seminar will be held in Bielefeld (FRG) in September 1978, in which ICSU CTS will collaborate with the International Commission for Mathematical Instruction, the International Commission on Physics Education and UNESCO, to consider cooperation by science and mathematics teachers; (d) the *ICASE Newsletter*, Volume 5, Number 1 (Issue 8) was published in March 1978; (e) ICSU was planning a colloquium to provide a contribution to the UN Conference on Science and Technology for Development. IUPAC CTC has been invited to prepare papers to be considered by CTS; (f) a UNESCO conference on Science and Society may be arranged in 1982; (g) a sub-group, with Prof. LOCKARD as convenor and including the Secretary, has been set up to review where international cooperation on technical education may be helpful; (h) UNESCO is inviting participation in their post-graduate programme both from ICSU CTS and from individual Unions.

18. Next Meeting. The following dates were tentatively proposed: 27 August and 1 September 1979, in Trinity College, Dublin (immediately before and after the Symposium).

Present: Prof. C. N. R. RAO (Chairman), Prof. D. J. WADDINGTON (Secretary), Prof. G. ILLUMINATI, Prof. M. LAFFITTE, Dr. T. M. SUGDEN, Prof. D. VITOROVIC (Members), Prof. H. BREMER (GDR), Prof. R. GUILLAUMONT (France), Dr. U. HOFACKER (FRG), Prof. B. T. NEWBOLD (Canada), Prof. R. C. PAUL (India), Dr. M. D. ROBINSON (UK), Prof. J. T. SHIMOZAWA (Japan), Mr. P. A. START (Ireland), Prof. C. SZANTAY (Hungary) (National Representatives), Mrs. S. D. HAGGIS and Dr. J. V. KINGSTON (UNESCO) (Observers).

HARMONIZATION OF COLLABORATIVE ANALYTICAL STUDIES

The Analytical Chemistry Division and the Applied Chemistry Division of the International Union of Pure and Applied Chemistry, together with the Section on Clinical Chemistry are conscious of the important part which applied analytical methods, collaboratively studied on a national or international basis, play in relation to important areas of everyday interest including health and commerce. The subject is of wide interest at the international level, to trade organizations and intergovernmental agencies and whilst there is a large measure of professional co-operation both within and between these areas there is also some unintended duplication. A number of international organizations have, in response to national and international trade interests, developed highly organized systems for the establishment of such methods, their publication and where necessary, revision. Collaboratively studied methods, established and agreed on this basis, can be regarded as one of the most important end products of chemical teaching, investigation and research. However, except in some limited areas, there is at present no systematic coordination between the various bodies and there is no simple means by which those needing new methods can ascertain whether methods already available will meet their needs.

INTERNATIONAL SYMPOSIUM

London: 9–10 March 1978

The Symposium, attendance at which was by invitation only, brought together representatives of some of the principal international organizations which sponsor and publish compendia of methods based on collaborative analytical studies.

Following a welcome to participants by Prof. T. S. WEST (President, Analytical Chemistry Division) on behalf of Prof. G. SMETS (President, IUPAC), the meeting was opened by Prof. H. FREISER for the Division of Analytical Chemistry, Dr. P. LOUS for the Commission on Clinical Chemistry and Dr. H. EGAN for the Division of Applied Chemistry. Each participating organization then presented, briefly, an account of its own approach to the collaborative study and standardization of analytical methods: summaries of most of these are given later in this account. There was general agreement that for a purposeful approach to such collaborative studies it was necessary first to

define needs and priorities before selecting candidate methods for study (including, at this stage, a preliminary practical study if necessary). The needs were recognized as falling broadly into three groups, those relating to the support of health and well-being of man and animals, those relating to commerce, trade, quality control and consumer protection and those simply in support of the furtherance of knowledge. The test protocol, which should include a statement relating to the number of collaborators should be provided, and examined by the participants. The number of participants might then be increased for a further study after modification in the light of experience gained in the preliminary study.

A collaborative study could be defined as 'an interlaboratory experiment designed to estimate the characteristics of a method'. The prescribed method must be followed in all circumstances, though participants were free also to try their own methods on the same sample for comparison. Particular recognition was given to the approach developed by YODEN and STEINER¹, to the need to publish the results of collaborative studies and to the desirability of encouraging, where appropriate, joint collaborative studies. The distinction between 'defining methods' and others was also recognized, together with the need for an accepted classification scheme for methods. Special reference was made to the four types under discussion by the United Nations FAO/WHO Codex Alimentarius Commission: defining methods, reference methods (for international disputes or calibration purposes), methods which otherwise meet all the basic Codex criteria for acceptance² and methods which have come into general use but for which compliance with Codex criteria has yet to be established; and to the role of certified standard reference materials in comparing and validating methods.

In view of the enormous range of interests covered by the subject it was important that some understanding should if possible be reached in the criteria for the acceptance, and where appropriate the comparison, of collaboratively studied methods. In order to do this consideration should be given to agreeing which criteria might be selected as characterizing such methods, to the definitions of these, to the values or limits within which these, perhaps for various purposes, should be regarded as acceptable and to the methods of study for the practical assessment of these. IUPAC had published definitions for certain parameters, including accuracy and precision³ but there was no universal agreement in this field and in any case it was probably necessary

to develop definitions specifically in the context of collaborative studies. Some indication of the scope of the problem had been discussed at earlier meetings^{4,5} although the present occasion was probably the first at which representatives of a broad range of sponsors of collaboratively studied methods had met. Whilst it was not appropriate that decisions as to universally agreed definitions should be endorsed or formulated this could be regarded as a long-term objective and the following descriptions, based on published ISO and IUPAC definitions, were used at the meeting as a basis for discussion:

Precision (Reproducibility). The closeness of agreement between the results obtained by applying the experimental procedure several times under prescribed conditions in an interlaboratory collaborative study.

Accuracy. The closeness of agreement between the true value and the mean results obtained by applying the experimental procedure a very large number of times. In practice this should involve as many results as possible, the total number being stated.

Limit of Detection. The smallest concentration (or amount) of substance which can be reported with a specified degree of certainty by a definite, complete analytical procedure.

Sensitivity. The change in measured value resulting from a concentration change of one unit. These were considered specifically in relation to methods established by interlaboratory collaborative study and whilst values or limits for each were not discussed in detail the idea was put forward that in practice the assessment of precision (reproducibility) should be based on studies in which the product of (number of participating laboratories) times (samples examined) should be at least 30, the number of participating laboratories normally being at least six (but, in special cases only, never less than three); and the concentration range covered should be stated. It was recognized that it is not normally possible to maximize simultaneously all of the main parameters above; and that there were others which were not quantifiable (but no less important) including practicability and applicability.

Whilst no formal decisions were taken at the meeting, it was generally agreed that the compilation of a directory of organizations sponsoring collaborative analytical studies, perhaps together with a compendium of existing methods agreed on the basis of international collaborative study and the maintenance of this, would be useful objectives which IUPAC and ISO jointly might consider, possibly in conjunction with AOAC and other organizations represented; and that further consideration should also be given to the harmonization of the definitions of the main parameters, such as those based on current IUPAC/ISO definitions indicated above. A small joint Working Party to progress these matters would be useful but it was left to the organizations individually to consider these matters further and, if thought appropriate, take them up with IUPAC.

REPORTS OF INDIVIDUAL ORGANIZATIONS ON COLLABORATIVE STUDIES

Association of Official Analytical Chemists (AOAC)

The AOAC has been developing collaborative studies for nearly 100 years. A collaborative study may be defined as an experiment designed to evaluate the performance of a method of analysis through the examination of a number of identical samples by a number of different laboratories. With proper design it provides an unbiased evaluation of the performance of a method, in the hands of those analysts who will use it, with respect to accuracy, precision, sensitivity, applicability, specificity, limit of detection, limit of reliable measurement, selectivity and practicality.

Analysts participating in a collaborative study must follow the method as written, not introduce modifications. The expected level of the analyte should be known to the collaborator only in general terms.

Statistical treatment of the data is considered essential in a rigorous evaluation of the method and is required for all studies. The Association considers this of such importance that it provides statistical assistance in all cases where it is otherwise unavailable to the leader of the study. A statistical manual is also provided.

A collaborative study must be distinguished from those studies designed to choose a method or to determine laboratory or analyst proficiency. The results of the study should be published so as to be available to all interested analysts.

European Brewery Convention

The Analysis Committee can only test published or well tried methods. It cannot carry out research on methods. The procedure is for the national representative on the Main Committee to identify and state the need for a method. The Chairman of a subcommittee is then nominated and invites experts from four or five laboratories to join in preliminary screening and selection of methods. The best method or perhaps two alternatives, are then compared using the YOUNG and STEINER¹ 'unit block' method. Assuming that the method proves satisfactory, usually needing two collaborative trials in the Main Committee, an account of the trial is published in the brewing journals. Only the description of the method, with the within laboratory error, between laboratory error and the 95% confidence limits are included in Analytica.

Many of the methods employed are empirical, i.e. the value obtained is defined by the analytical conditions used. There are no permanent standards. Thus, the Committee provides secondary standards where needed; e.g. Check Malt samples which have been analysed comprehensively by the whole Committee so that 95% confidence limits can be quoted.

International Organization for Standardization (ISO)

ISO is the specialized agency for standardization, comprising the national standard institutes of 84

countries. In the field of chemical analysis, the policy of ISO is the definition of standard methods at international level, purposely studied and detailed to meet the specific requirements of a particular analytical problem, and to enable the analytical chemist to produce fully comparable results, no matter where in the world the analyses are performed. Methods are chosen from those which are already well established, and continuous revision and up-dating is carried out with a 5-year frequency.

About 30 of the 1900 technical bodies of ISO deal with chemical analysis, and in particular ISO TC/47 'Chemistry', the aim of which is standardization in the field of chemical industry in general, with particular reference to the basic chemical products the use of which is current in widely different industries, and which are not covered by other technical committees of ISO.

At present, the main task of TC/47 is to define analytical methods for the application of general analytical techniques or for the determination of a given element, starting from a solution at well-defined chemical conditions. These general methods will be adopted in various fields where there is a need, standardizing the procedures to bring the different specific materials to the chemical conditions suitable for the application of the general method. To date, about 400 methods have been standardized by ISO TC/47 and a number of other methods are in the stage of draft proposal or draft International Standards. Attention is also devoted to the general harmonization of these standardization activities, and norms for drafting standard methods are being prepared.

A draft proposal was recently prepared by ISO TC/69 'Applications of Statistical Methods' for the standardization of the organization and analysis of interlaboratory tests for the determination of repeatability and reproducibility of standard analytical methods (ISO DIS/5725). Work is also in progress on procedures to be followed by users of standard methods for the application of the performance characteristics of methods.

In all these activities, ISO has often faced the problems that arise in collaborative analytical studies. It is conscious of the work that is needed to resolve them and the problems associated with the lack of harmonization and coordination of the work of the many different organizations operating in this field. ISO is thus anxious to cooperate towards the harmonization of international collaborative analytical studies.

International Association for Cereal Chemistry (ICC)

The ICC was founded in 1955 as a non-political, non-profit making organization whose task was to standardize analytical methods for cereals and milling products for the benefit of international trading standards. With a permanent secretariat in Vienna, the Association now consists of 33 countries from all geographic locations.

To achieve its objectives, the Association has set up a system of 'Study Groups' each with a recognized expert as Chairman. The Chairman then invites

an instructional team to participate in the work of developing an appropriate analytical method. Some 30 such Study Groups are now organized to cover all aspects of cereals including sampling and statistical procedures as well as milling, baking and nutritional analyses.

A series of 'Guidelines' for the procedure to be followed by a Study Group in developing an 'ICC Standard' has been drawn up. The essential features are: collaborative testing on the international level, regular meetings whenever appropriate, a reappraisal of standards after 6 years. To date, 29 ICC Standard methods have been published. Some of these have been taken up by ISO and other international organizations. Indeed, effective cooperation with such bodies as AACC, AOAC, EBC, EEC, FAO, ISO and IUPAC has led the Association to the new objective of acting as coordinator of efforts made by various organizations and a synoptic table of methods of analytical investigation in cereal chemistry has been drawn up. The ICC welcome the opportunity of further collaboration and instruction with interested International Organizations.

International Committee for Standardization in Haematology (ICSH)

ICSH was founded 15 years ago, initially because of the chaotic situation with haemoglobin measurement. A collaborative study led to the International Haemoglobincyanide Reference Preparation, and a subsequent remarkable improvement in haemoglobinometry in many countries. ICSH functions essentially by consensus. Expert Panels, set up by the Board, carry out collaborative experimental studies and also consult widely with national haematology committees, international contacts (which include IUPAC, WHO IAEA, IFCC) and individual authorities. Final decisions or recommendations are made at the assembly which represents national haematology societies, thus assuring their subsequent acceptance by practising rank and file of the profession.

ICSH is now active in a wide range of topics—there are 14 Expert Panels and six Standing Committees. Some of the subjects have close connection with the interests of IUPAC and IFCC (e.g. serum iron, folate, Vitamin B₁₂, red cell enzymes, cyclochemistry, haemoglobinopathies and haemoglobinometry). Problems of cell counting and sizing are shared with other bodies, such as ICC and IDF. Haematology is also concerned with qualitative analysis, e.g. blood film staining and morphological diagnosis this too requires reference materials and methods. Specimen collection and aliquot reliability is a problem shared with every organization represented at the meeting. ICSH supports the concept of interdisciplinary collaborative studies.

European Economic Community (EEC)

General Directorate of Agriculture. Collaborative studies on analytical methods are carried out with the purpose of establishing official methods for the

control in the Member States of provisions laid down by EEC regulations in the field of foodstuffs and feeding stuffs. This includes fundamental components, trace elements, additives, contaminants, pesticide residues, etc. As of this date, one method of sampling and about 50 methods of analysis have been adopted in this field and enforced in the Member States. These methods are the subject of EEC Directives which are published in the Official Journal of the European Communities.

Occupational and Environmental Health. The aim of all these harmonization and standardization efforts is to ensure that the analytical steps in community legislation to protect the health of the worker and the population from physical, chemical and biological agents will provide adequate and equal protection throughout all the Member States of the European Community. Up to now more than 20 inter-comparison programmes with a view of harmonization of results and sometimes standardization of procedures have been carried out in the field of radioactive substances, air pollution, water pollution and human biological tissues. Close to 500 laboratories have participated in this effort.

In view of the importance placed at present on evaluating the toxicological effects of chemical substances, a two-stage LD50 inter-comparison programme has been initiated with the participation of more than 100 laboratories, not only from the Member States of the European Community but also from Canada, Japan, Switzerland and U.S.A. The aim of this programme is to test the variability of LD50 measurements, evaluate the most important parameters and arrive at a standard protocol.

Within the framework of a Community Directive, presently in force, on the biological screening of the population for lead, a long-term continuous quality control programme on the measurement of lead in blood has been initiated with the participation of 50 laboratories whom the Member States have designated to apply the Directive. Acceptable analytical limits have been established, in view of the needs in the Directive, against which the performance of the laboratories will be evaluated. In the future it is intended to develop and harmonize the analytical procedures for the measurement of human biological indicators of exposure to harmful substances, in particular at the work place.

All the above studies have been carried out whenever possible in close cooperation with International Organizations specialized in these fields. It is intended to do so in the future, taking as much as possible the results obtained elsewhere and applying them in the Community context.

International Agency for Research on Cancer (IARC)

Since it had not been possible to select at the outset a single method for the study of trace volatile nitrosamine estimation, a cooperative study had been conducted in which each laboratory analysed identical samples spiked with several nitrosamines by any method of choice. Most of the gas chromatographic techniques selected had responded well to this

approach, even at levels of added nitrosamine down to 5 or 10 micrograms per kg. The choice initially of a single method would have resulted in the loss of participant interest, although such a choice would have been desirable for legal purposes.

International Federation of Clinical Chemistry (IFCC)

The importance of collaborative analytical studies was clearly indicated in 1952 by the Founding Committee of IFCC which included amongst its Aims and Objects 'the circulation of solutions and samples for the comparison of methods and results, and attempts to standardize the expression of results of such methods'. This statement implicitly recognized the value of external quality assurance surveys in assessing the relative precision of different laboratories and different methods. Such surveys continue to be widely used throughout national and international networks of clinical laboratories: in recent years their usefulness has been enhanced by the development of objective means of assessing inaccuracy, as well as imprecision, of certain analyses.

Since 1966, the Committee on Standards of IFCC has addressed particularly difficult problems in clinical chemistry by means of Expert Panels—on Quantities and Units; Proteins; Bilirubin; Enzymes; Quality Control; Reference Values; Instruments; pH and Blood Gases; Immunoassay; and Drugs. In addition, an Office of Reference Materials and Methods and an Expert Group on Diagnostic Kits and Reagents was set up. Much of the work of these Expert Panels is done in Committee and is directed at achieving and implementing international consensus on basic matter of analytical principles and terminology. However, two Panels—Enzymes and Proteins—have conducted collaborative studies so as to define or characterize a particular method or material. At the same time, one of the functions of the Office of Reference Materials and Methods has been to encourage and disseminate information about relevant inter-laboratory trials in clinical chemistry, and work towards guidelines for their proper conduct.

IFCC welcomes attempts to harmonize collaborative analytical studies, both of materials and methods, and believes that such studies are essential in establishing their credibility, and their transferability over space and time.

Nordic Committee on Food Analysis

The Nordic Committee on Food Analysis is a joint body of the four Scandinavian countries, Denmark, Norway, Sweden and Finland, founded in 1947. The members are nominated by government authorities of each member country.

The new operating scheme, accepted at the last annual meeting, includes collaborative testings and publication of the testing results. In the testings and statistical treatments, instructions described in the manuals of AOAC are followed. Special instructions

are prepared for gas chromatographic as well as for microbiological methods. There is also a possibility to accept methods developed and collaboratively tested by other organizations. In these cases, any modifications of the original method are avoided. Each method can be taken for revision when needed, and in each case at 10 years' intervals. The number of methods published is nearly 100; in the working programme there are about 60 methods. These include chemical, physical, microbiological, sampling and statistical methods, preferably applicable for several kinds of foods. Since the capacity of each organization developing standard methods is limited, more close cooperation is needed. In addition to the harmonization of collaborative studies, the following measures should be taken: (i) a register of the existing standard methods and their testing reports, (ii) a register of standard methods under preparation, (iii) a register of the availability of reference materials, (iv) joint collaborative testings, (v) common working groups for methods defining a concept.

Codex Alimentarius

The Codex Alimentarius FAO/WHO Food Standards Programme was established in 1962 and operates chiefly through the Codex Alimentarius Commission and its Executive Committee. There are 114 member countries. The Commission is an inter-governmental body whose work programme aims to elaborate Food Standards so as to protect the consumer against health hazards in food and against fraud; to ensure fair practices in the food trade and to facilitate international trade in food.

The Commission works through three types of Committees. (i) *Commodity Committees* specialize in the preparation of International Standards to ensure that foods moving in international trade are of good quality. (ii) *General Subject Committees* which endorse requirements common to most standards. (Methods of analysis for composition and quality, hygiene, labelling.) (iii) *Regional Coordinating Committees* are responsible for submitting to the Commission the case for standardization of foods of importance to their regions. The Commission has established a procedure for the elaboration of Food Standards which allows all parties adequate time to come to an agreement on the content of standards at which time they are submitted to Governments for acceptance and eventually for integration into national legislation.

The terms of reference of the Codex Committee on Methods of Analysis and Sampling (CCMAS) are (i) to specify standard methods generally applicable to a number of foods; (ii) (a) to consider, renew if necessary and endorse draft methods proposed by Codex Committees, or (b) to develop at the request of and in collaboration with such Committees such methods for subsequent endorsement; (iii) to revise such methods; and (iv) to consider specific sampling and analytical problems assigned to it by the Commission. At present these methods are defined for Codex purposes and are 'referee' methods for use in cases of international arbitration.

Recent developments, however, make it likely that the Committee will reclassify the methods necessary for standardization into four types: (i) a method which defines a specification in terms of the method *per se*; (ii) reference methods to be used for calibration purposes and in cases of international dispute; (iii) methods meeting all the criteria of the CCMAS to be used for control, inspection or regulatory purposes; (iv) traditional or recent methods for which CCMAS criteria have not yet been determined (often the missing information would be reproducibility based on collaborative studies).

Many methods which have not been subjected to collaborative study have been accepted by Codex from international organizations. The Codex Alimentarius Commission has endorsed such methods as a temporary measure, but is committed by its terms of reference to give preference to methods which have been established by collaborative studies and to this end encourages the harmonization of such studies among international bodies.

American Society for Testing and Materials (ASTM)

ASTM is a non-profit organization founded in 1898 for the purpose of developing standards for materials and materials testing. Today its scope is much broader, encompassing the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge. There are nearly 27000 members, 10% of whom come from outside USA. ASTM is international in its standards work and in respect to standards usage and currently publishes the Annual Book of ASTM Standards, containing some 6000 standards prepared by 130 technical committees divided into 1650 subcommittees and several thousand additional subgroups known as task groups. In addition the committees sponsor research programmes that have resulted in special technical publications covering many disciplines. Such research generally precedes the development of standards programmes.

The range of subject matter covered is almost limitless, including steel products, plastics, medical devices, chemical analysis and mechanical testing. Standards in ASTM terminology include test methods, definitions, practices, classifications and specifications. Effective standards development programmes consider the essential elements of data base, interlaboratory testing, statistical analysis and the availability of vital standards reference materials. To strengthen its commitment in this respect, it has established a Research Associate Programme housed at the National Bureau of Standards for the purpose of providing assistance to the Office of Standard Reference Materials by interfacing with the producers and consumers of metal and ore materials and then utilizing their expertise and their subsequent input to reflect their needs for specific standards. This Programme is administered through ASTM Committee S17, composed of elected members of ASTM Committees E2, E3 and E16.

International Dairy Federation (IDF)

The IDF is a non-governmental, non-profit making international organization. In each of the 28 member countries, a National Committee is in direct liaison with the General Secretariat, which is located in Brussels. The General Assembly and the Executive Committee are presided over by the President of IDF; the technical and scientific work of the Federation is carried out through the Commissions and the Groups of Experts which report to them.

Analytical standards, in the field of chemistry and bacteriology and on sampling, are developed by Commission E: Analytical Standards, Laboratory Techniques. A group to study ways to assess the repeatability and reproducibility of analytical methods was set up in 1972. In September 1977 the Groups of Experts were requested to conduct collaborative studies in the development of standards, using ISO/DIS 5725 Precision of test methods: Determination of repeatability and reproducibility and the AOAC Statistical Manual for guidance. Most of the Groups of Experts are joint groups, so joint IDF/ISO/AOAC Standards are normally developed.

United Kingdom Assay Offices

Although the cupellation method for gold is of considerable antiquity, it is generally acknowledged to be highly accurate and the best available. However, as far as can be ascertained, no attempt has previously been made to undertake any collaborative or cooperative study involving more than one or two participants. Two standard alloys have been circulated to the participants with specific instructions as to the minimum number of results to be reported. A variety of methods are in routine use by the partici-

pants for the determination of silver alloys and as a first step each participant is carrying out a number of determinations by their normal procedure on four standard alloys of proven uniformity. It is proposed to study the results with a view to assessing the relative merits of the different methods. A further step may be a collaborative study using one selected method. Standard alloys are by no means new, since an independent testing of British coinage of the realm has been carried out at frequent intervals during the past 700 years by assaying selected sample coins against standard alloys, known as Trial Plates, of the same legal composition as the coinage itself. This testing, which is known as the Trial of the Pyx, is carried out annually. The problem of obtaining alloys of uniform composition has been well known for many years and in the case of silver an alloy plate has been discarded in favour of fine silver as the reference standard. However, the present study has indicated that it is possible to obtain alloys in the form of drawn wire which are sufficiently uniform for the purpose of a collaborative study.

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H. EGAN

REPORTS OF IUPAC-SPONSORED SYMPOSIA

INTERNATIONAL CONGRESS ON THE ROLE OF LABORATORY TEACHING IN UNIVERSITY CHEMISTRY COURSES

Perth: 13–17 February 1978

The Congress was held at the Sheraton-Perth Hotel under the sponsorship of UNESCO, IUPAC, The Australian Academy of Science and the Royal Australian Chemical Institute (RACI). The principal plenary lectures have been published in *Pure and Applied Chemistry*, Vol. 50, No. 6 and other proceedings will be summarized in a booklet to be issued by UNESCO in late 1978.

About 100 people from 29 countries participated in the meeting, comprising 20 from developing countries supported by UNESCO, 40 other delegates from overseas and 40 Australians. Generous financial support from the Western Australian Government and the RACI enabled the Organizing Committee to bring 10 speakers from developed countries.

The Congress was arranged as a sequel to UNESCO Regional Workshops on Laboratory Work in Chemistry which had been held in Korea (1975), Jordan (1976), and Mexico (1977), and followed immediately a similar meeting in Adelaide conducted by the RACI to discuss problems of laboratory work with particular reference to Australian higher education. The programme of the Perth Congress dealt principally with difficulties encountered in developing countries, but it became obvious during the meeting that many of those problems were indistinguishable from cases arising when dealing with underprivileged communities in developed countries. Furthermore, the problems of designing and teaching a laboratory course in a country where exposure to technology and technical equipment is limited, are not very different from those experienced in advanced countries in teaching university chemistry to students who have not studied experimental physics or chemistry at high school.

The Congress was opened by Senator J. L. CARRICK, Australian Minister for Education, and greetings were presented from the sponsoring bodies by Prof. R. O. SLATYER (Australian National Commission for UNESCO), Prof. C. N. R. RAO (IUPAC) and Prof. A. R. H. COLE (Australian Academy of Science and RACI).

Prof. RAO (India) began the Congress proper with a paper entitled 'Are Laboratory Courses Necessary?' The answer he gave was a strong affirmative, since he reminded the participants that chemistry is very much an experimental science, and a very large part of its teaching must be concerned with observations, manipulative skills, data analysis

and report writing. Nevertheless, he expressed some pessimism at the wide range of success achieved as a result of what is a very expensive and time-consuming operation. He pleaded that the wide spread of student interest and enthusiasm be taken into account in the design and development of laboratory programmes, and drew attention to the very real problems of expense and lack of technical assistance in conducting such programmes in developing countries.

Prof. E. C. WATTON (Australia) gave a personal account of laboratory work in universities as he had observed it over many years in both developed and developing countries. After referring to the widespread use of untrained research students as laboratory demonstrators (teaching assistants), he described a number of successful projects in which the demonstrators played a significant role in the early development of the courses. This experience made them much more knowledgeable and enthusiastic about teaching the courses well in practice. The speaker also described the Pilot Project for Chemistry Teaching in Asia and the development of laboratory courses in Jordan.

The accomplishments of previous UNESCO Regional Laboratory Workshops were summarized by a panel of speakers consisting of Prof. D. WADDINGTON (York), Dr. CHANG-HWAN KIM (Korea), Dr. M. H. FREEMANTLE (Jordan), Prof. M. NAZER (Jordan), Prof. E. GIESBRECHT (Brazil) and Prof. J. PADILLA-OLIVARES (Mexico). These workshops have resulted in the publication by UNESCO of two sourcebooks of laboratory experiments which are undergoing evaluation in various countries.

Mr. J. DEVENPORT (Australia) reported on the RACI Adelaide Conference, some details of which will be published in *Chemistry in Australia*.

Prof. G. P. HAIGHT and Prof. MARJORIE GARDNER presented papers dealing with various aspects of laboratory teaching in the USA. The former gave a wide-ranging survey of American experience in developing courses for chemistry majors and for the large number of non-major service classes, and touched upon special laboratory courses for under-privileged groups. He then described some applications of computer simulation of laboratory experiments as an aid to pre-lab discussions. Prof. GARDNER put forward a strong case for integrating a training course for laboratory demonstrators (teaching assistants) into higher degree course-work, with credit for those completing it.

Prof. H. KHALIFA (Egypt) described the problems (both financial and political) of handling very large groups of students in the laboratory and Prof. E. SOKOLOVSKAYA discussed in detail university

laboratory courses in the USSR, and the training of high school chemistry teachers.

The need for closely integrating laboratory work with lectures was stressed by Dr. SAON PATUMTEVAPIBAL (Thailand), who also analysed the difficulties which arise when students whose normal language is not English are forced to work from English-language textbooks and laboratory manuals. This problem of communication was also taken up in detail by Dr. M. H. FREEMANTLE (Jordan) in an excellent paper on 'The Development of Laboratory Courses in Chemistry in Developing Countries'. He set out the following five principles as the basis for his analysis:

- (i) Teachers and demonstrators must put their hearts not only into teaching but also into chemistry.
- (ii) The laboratory should be central to chemistry teaching and not an adjunct.
- (iii) Students at all levels should be confronted with the unknown as well as the known.
- (iv) Courses must be kept alive and fresh.
- (v) Beginning courses must be adapted sympathetically to the abilities of the students.

The application of these principles was illustrated by reference to a laboratory-based postgraduate course in chemical education and a second year undergraduate course in quantitative analysis at the University of Jordan. The overall approach was to use the postgraduate course to evaluate and develop the undergraduate course, so that the demonstrators were simultaneously trained to be keen and competent teachers. The speaker also stressed the need for university staff, including full professors, to work closely at the bench with students in undergraduate laboratories.

Prof. M. J. FRAZER (East Anglia) spoke on the evaluation of student performance in the laboratory, and the improvements to the course which can result from the feed-back of evaluation information.

Analytical Chemistry in undergraduate and postgraduate laboratory programmes was discussed by Dr. J. A. W. DALZIEL (Chelsea), and the nature of the laboratory work most appropriate for service courses (e.g. for Engineering students) was analysed by Dr. J. GRIFFITH (Australia). She concluded that a chemistry laboratory course for Engineering students should not be seen as attempting to turn them into Chemistry majors, but should lay the foundations for later application in Engineering, and should make wide use of examples from that field. Close cooperation between Chemistry and Engineering staffs is essential in the planning of such a course.

A panel of speakers consisting of Prof. M. U. S. SULTANBAWA (Sri Lanka), Dr. A. H. GUERRERO (Argentina) and Dr. S. M. AL AMIN (Sudan) under the chairmanship of Prof. A. EL-JIBURY (Iraq) discussed in detail the problems of teaching students from non-technological backgrounds.

Other major topics discussed were the coordination of chemistry laboratory teaching in interdisciplinary programmes (R. SMART), and teaching in the laboratory alone, without formal lectures

(R. FAILES), while T. KENNEDY reviewed many recent developments in the field of laboratory teaching.

All members of the Congress were involved in discussion groups which analyzed in detail the various problems and possible solutions raised in the plenary sessions. Short reports on all discussions were compiled and will be published by UNESCO.

During an afternoon session held at the School of Chemistry, University of Western Australia, a poster session gave a large number of delegates the opportunity to display details of their favourite laboratory experiment and Prof. I. M. RITCHIE (Australia) demonstrated some extremely cheap simple items of equipment [e.g. a filter (visible) spectrophotometer c. \$30, a potentiometer c. \$15]. It is hoped that details of these items will be available through UNESCO in the near future.

A final discussion panel [Prof. N. S. BAYLISS (Australia), Prof. C. N. R. RAO (India), Prof. A. KORNHAUSER (Yugoslavia), Dr. D. ODHIAMBO (Kenya) and Dr. J. KINGSTON (UNESCO, Paris)] summed up the proceedings. Prof. KORNHAUSER brilliantly described the tasks which still remained to be done, and indicated the areas of responsibility for them (UNESCO, national organizations, universities, individual teachers).

Numerous recommendations from the Congress will be published by UNESCO, the major points among them being the following:

1. Laboratory teaching is an *essential* part of chemistry teaching and must remain a substantial part of chemistry courses.
2. The professional chemical societies of the more developed countries should be approached to assist and materially support regional workshops, summer schools, inservice courses, all carried out directly with tertiary chemistry teachers. UNESCO should support already existing regional chemical associations, and assist in the formation of these associations in areas where none presently exist.
3. Closer links should be developed between university chemistry departments on a regional level, particularly with regard to laboratory curriculum development.
4. Suggested topics for future workshops, from which sourcebooks would result are: (a) low-cost experiments and low-cost equipment; (b) properties and reactions of common materials, both organic and inorganic; use of local materials; (c) technician training, especially in instrument servicing; (d) teaching guide for lab demonstrators.
5. There is a need for the establishment of a network of university chemistry teachers with the following functions: (a) to receive, publicize and disseminate UNESCO chemistry publications, materials and programmes; (b) to collate evaluations of UNESCO materials in each country; (c) to initiate suggestions for future UNESCO action in the chemical field.

Social functions during the Congress included a reception by the Lord Mayor of the City of Perth and a buffet dinner given by the Swan Brewery Company. The organizing committee wishes to acknowledge these functions with thanks.

Finally, all delegates were loud in their praises for

the organizational work carried out by the Congress Secretary, Prof. D. W. WATTS, and by Mr. L. FISHER and his staff of the Australian National Commission for UNESCO.

A. R. H. COLE

IX INTERNATIONAL SYMPOSIUM ON CARBOHYDRATE CHEMISTRY

London: 10–14 April 1978

The symposium was held in the Bloomsbury district of London in the recently completed new building of the Institute of Education of the University. Organized by the Perkin Division of the Chemical Society (London) and its Carbohydrate Group, the meeting was held under the sponsorship of IUPAC and the International Steering Committee for Carbohydrate Chemistry.

About 700 participants (more than 550 from abroad, representing 30 countries) were registered for the meeting and many contributed to the scientific programme of Plenary Lectures, sessions of contributed papers, and poster sessions. Poster sessions were a new innovation for International Symposia in Carbohydrate Chemistry.

At the Opening Ceremony in the spacious and well-equipped Logan Hall of the Institute of Education, brief Addresses of Welcome to participants were given by Prof. W. G. OVEREND (Chairman of the Organizing Committee), Prof. L. CROMBIE (President of the Perkin Division of the Chemical Society), Prof. V. GOLD (Chairman, British National Committee for Chemistry and Titular Member of the IUPAC Commission on Physical Organic Chemistry), and Prof. J. BeMILLER (Secretary of the International Steering Committee for Carbohydrate Chemistry).

The Plenary Lecturers were chemists of international reputation and their contributions covered a wide range of modern carbohydrate chemistry. These eight lectures are scheduled for publication in *Pure and Applied Chemistry*.

In opening the scientific programme, Prof. W. F. LICHTENTHALER (FRG) discussed aspects of the chemistry of sugar enolones and described their synthesis, reactions of preparative interest, and gamma-pyrone formation. Subsequent lecturers dealt with syntheses and novel reactions of value in preparative chemistry. Dr. C. PEDERSEN (Denmark) outlined syntheses of bromodeoxy compounds from hexoses, polyols, and aldonic acids. Aspects of the synthesis of antibiotics were reviewed in extremely interesting lectures on 'Recent Advances in the Synthesis of Aminoglycoside Antibiotics' and 'Chiral

Syntheses of the Antibiotics Anisomycin and Pentenomycin' given respectively by Prof. S. UMEZAWA (Japan) and Dr. J. G. MOFFATT (USA). Important recent developments in the chemistry of glycosides were the subject of lectures by Prof. P. SINAY (France) and Prof. A. S. PERLIN (Canada). Prof. R. S. SHALLENBERGER (USA) reviewed the intrinsic chemistry of fructose.

The biosynthesis of *Salmonella* O-antigenic polysaccharide and the specificity of glycosyl transferases were described by Dr. V. SHIBAEV (USSR).

In addition the Haworth Memorial Lecture and the Tate and Lyle Lecture (named lectures of the Chemical Society) were included in the scientific programme. Prof. A. W. JOHNSON (Immediate Past-President of the Chemical Society) presented the Haworth Medal to Prof. R. U. LEMIEUX (Canada) who then delivered his medallist's address on 'Human Blood Groups and Carbohydrate Chemistry'. The Tate and Lyle lecturer was Dr. J. FRASER STODDART (Sheffield) who gave a fascinating review of his recent research work, entitled 'From Carbohydrates to Enzyme Analogues'.

All contributed papers (250) were presented in poster sessions and in addition two thirds of the contributed papers were given orally in five parallel sessions. A book of abstracts of papers was available to each participant, and the abstracts and poster sessions mitigated some of the disadvantages of holding parallel sessions.

The programme of contributed papers was organized around seven themes, as follows: industrial uses of carbohydrates, including their use as enzyme substrates—chemistry of carbohydrates in food and flavours; synthesis, including photochemical methods; stereochemical and mechanistic aspects of carbohydrate reactions; physicochemical aspects of carbohydrates; structural and biological aspects of polysaccharides, glycoproteins, and glycolipids; analysis of carbohydrates; medical aspects of carbohydrates.

Although no announcement of a spectacular discovery was made at the symposium, the general quality of the scientific papers was high and indicated that solid progress on a wide front is being made in carbohydrate chemistry.

The scientific part of the meeting was supplemented by a book exhibition and programmes of social activities and ladies' events.

During the symposium a meeting was held of the International Steering Committee for Carbohydrate Chemistry and it was agreed that the X International Symposium will be held in Sydney, Australia, in 1980.

W. G. OVEREND

FORTHCOMING IUPAC-SPONSORED SYMPOSIA

19th MICROSYMPOSIUM ON MACROMOLECULES

**Mechanisms of Degradation and Stabilization of
Hydrocarbon Polymers**

Prague: 9–12 July 1979

The Nineteenth Microsymposium, sponsored by IUPAC, will be held at the Institute of Macromolecular Chemistry under the auspices of Czechoslovak Academy of Sciences and Czechoslovak Chemical Society.

Scientific Programme

The Symposium will include in its scope new findings dealing with thermo- and photooxidative degradation (including weathering) and biodeterioration. Mechanism of initiation and processes of retardation or inhibition effected by low- and high-molecular additives as well as problems of regulated lifetime of polymers are to be considered. Only polyolefins, polystyrene, and rubbers will be discussed. Polymers containing other functional groups will be included only if the chain modification leads to degradable polymers. Processes above 300°C are excluded from the discussion. The following topics will be covered:

1. *Thermo- and photooxidative degradation.* Factors effecting the deterioration of polymers and their models (e.g. polymer structure, singlet oxygen, ozone, prodegradants etc.).

2. *Biosusceptibility.* Susceptibility to microorganisms, degradation during implantations, influence of additives. Connection between deterioration processes and biodegradation. Comparison with other synthetic polymers.

3. *Antidegradants.* New developments in the field of antioxidants, antiozonants, and light stabilizers, mechanisms of their actions and their transformations. Polyfunctional and polymeric additives. Synergism.

Nine invited lectures and 50–60 contributed papers are expected to be presented. Three panel discussions will be arranged. The summaries of invited lectures will be published in the Programme booklet and sent out in advance to potential participants. Full texts of the majority of invited lectures will be published in *Pure and Applied Chemistry*, the official journal of IUPAC. The following scientists have been invited to deliver a lecture:

D. J. CARLSSON (Canada)
T. E. DENISOV (USSR)
M. A. GOLUM (USA)
G. J. L. GRIFFIN (UK)
J. GUILLET (Canada)
H. NAARMANN (FRG)
B. RÅNBY (Sweden)
G. SCOTT (UK)
J. ZIOŁKOWSKI (Poland)

Contributions covering original unpublished work may be presented either as poster contributions or short communications. The summaries of contributed papers will be printed in the Programme booklet to be provided to participants in advance. Thematic contributions will be presented at panel discussions by (a) invited panel members, (b) by members coopted from those having submitted contributions that fit exactly the subject of panel discussion.

Correspondence

Enquiries and correspondence concerning the Symposium should be addressed to: P. M. M. Secretariat, c/o Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, 162 06 Prague 616, Czechoslovakia. Tel: 360341, Cable: Macro Prague, Telex: 122019 IMCP C.

20th MICROSYMPOSIUM ON MACROMOLECULES

Microcalorimetry of Macromolecules

Prague: 16–19 July 1979

The Twentieth Microsymposium, sponsored by IUPAC, will be held at the Institute of Macromolecular Chemistry under the auspices of Czechoslovak Academy of Sciences and Czechoslovak Chemical Society.

Scientific Programme

The Symposium will include in its scope the potentialities of microcalorimetric methods in the study of macromolecular systems with synthetic and natural macromolecules. Use of calorimetry for characterization and elucidation of structural, phase and chemical changes. Calorimetry as a source of values of the fundamental thermodynamic functions. Molecular

and structural interpretation of calorimetric data on macromolecular systems and their models. Desiderata regarding methods and instrumentation and following from specific properties of macromolecular systems. The following topics will be covered:

1. *Heat Capacities of Macromolecular Substances in Bulk and in Solutions.* Characterization of phase transitions (e.g. crystallization, glass transition etc.) and structure of amorphous and crystalline phases. Structures in solutions and their changes (e.g. intra- and intermolecular ordering, conformational transitions, dissociation of molecular complexes etc.).

2. *Heats of Physical and Chemical Changes* (sorption, swelling, solution, polymerization, poly-reactions etc.).

3. *Calorimetric Methods and Instrumentation.* 'Quasistatic' vs. dynamic measurements and slowness of changes in macromolecular systems.

Eight invited lectures and 50 contributed papers are expected to be presented at the Microsymposium. Moreover, three round-table discussions on main fields of interest are foreseen. The following scientists have been invited to deliver a lecture:

H. BAUER (FRG)
R. L. BILTONEN (USA)
J. E. DESNOYERS (Canada)
F. E. KARASZ (USA)
D. PATTERSON (Canada)
P. L. PRIVALOV (USSR)
I. WADSÖ (Sweden)
B. WUNDERLICH (USA)

Arrangements for presenting contributions are as given for 19th Microsymposium (see p. 141).

Correspondence

The address for enquiries and correspondence is as given for 19th Microsymposium (see p. 141).

8th INTERNATIONAL MASS SPECTROMETRY CONFERENCE

Oslo: 12–18 August 1979

The Eighth International Mass Spectrometry Conference will be held at the University of Oslo, Blindern in the modern buildings of the Department of Chemistry. It is organized by the Norwegian Chemical Society and the Norwegian Society for Mass Spectrometry. The conference is sponsored by the International Union of Pure and Applied Chemistry, the Federation of European Chemical Society, and the Institute of Petroleum. The official language of the Conference will be English.

Accommodation and arrangement of the social programme is in the hands of Bennett Congress Service, Karl Johans gate 35, Oslo 1, Norway, to whom applications for accommodation should be sent and fees paid.

Scientific Programme

The scientific programme will cover traditional topics, like theoretical aspects, instrumentation and data systems, mass spectral management and interpretation techniques, and different aspects of organic, inorganic and biomedical mass spectrometry, such as environmental control and occupational disease protection. The programme shall also include trends in mass spectrometry, its practical, instrumental and philosophical aspects, like liquid chromatography/mass spectrometry techniques, fourier transform ion cyclotron resonance, field ionization kinetics, photo-electron-photoion coincidence, instrumental innovation, and data analysis including pattern recognition, principal component analysis and digital multivariate classification techniques.

The programme will consist of plenary surveys and up-to-date review lectures, shorter original contributions and Round Table discussions. There will also be an instrument exhibition. Participants who wish to present lectures are requested to submit abstracts of no more than 100 words (structural formulae are not accepted in the text) before 1 December 1978. All abstracts will be reviewed following which lecture manuscripts together with ready-to-print illustrations should be submitted for printing in the Proceedings of the conference not later than 1 August 1979.

Correspondence

Enquiries and correspondence concerning the Conference should be addressed to 8th International Mass Spectrometry Conference, PB 1048, Blindern, Oslo 3, Norway.

INTERNATIONAL CONFERENCE ON PHOSPHORUS CHEMISTRY

Halle (Salle): 17–21 September 1979

The International Conference on Phosphorus Chemistry will be held in Halle/Salle, German Democratic Republic during 17–21 September 1979. The Conference sponsored by IUPAC, is being organized by Martin-Luther-Universität Halle-Wittenberg in collaboration with Academy of Sciences of GDR and Chemical Society of GDR. It will integrate both inorganic and organic chemistry of phosphorus including structural, stereochemical, analytical and spectroscopic aspects. Previous Conferences in this series were held in Prague (1974) and Gdansk (1974). Although the official languages of the Conference will be English, Russian, German and French, the speakers should choose the language understood by the majority of participants (preferentially English).

Scientific Programme

The Conference will cover the following topics: (i) Lower Valency Phosphorus Compounds including Reactions of Elemental Phosphorus; (ii) Phosphorus Halides, Phosphorus Chalcogenides and

Phosphates; (iii) Phosphorus Nitrogen Compounds, Phosphazene-Chemistry; (iv) Synthetic and Stereochemical Aspects of Phosphorus Compounds; (v) Phosphines, P-Alkyls and Related Compounds; (vi) Acid Derivatives of Phosphorus; (vii) Phosphorus Heterocycles; (viii) Phosphorus Polymers; (ix) Structure and Bonding—Application of Physicochemical Methods for Structure Elucidation in P-Chemistry; (x) New Applications of Phosphorus Compounds; (xi) Phosphorus in the Biosphere; (xii) Phosphorus Ligands in Coordination Compounds.

The programme will consist of plenary lectures (45 min), main lectures (30 min + 5 min discussion) on each of the 12 topics and contributed papers (15 min + 5 min discussion). Contributed papers will be presented in parallel sessions.

Correspondence

Enquiries and correspondence concerning the Conference should be addressed to Prof. Dr. K. ISSLEIB, Martin-Luther-Universität, Sektion Chemie (ICPC '79), Weinbergweg 16, DDR-402 Halle/Salle, GDR. Telephone: 622210.

INTERNATIONAL SYMPOSIUM ON MACROMOLECULES

Mainz: 17–21 September 1979

The 26th International Symposium on Macromolecules will be organized by Gesellschaft Deutscher Chemiker in the Congress Center 'Rheingoldhalle' in Mainz/Rhein (Federal Republic of Germany). The meeting has been sponsored by IUPAC, Federation of European Chemical Societies and other relevant societies and some universities in FRG. Accommodation will be provided by Verkehrsverein Mainz at different prices which will be announced later in 1978. A limited number of rooms will be available in student hostels.

Scientific Programme

The scientific programme has been divided into six sections as given hereunder:

Section A: Syntheses—Novel Methods and Processes; Kinetics and Mechanism; Stereochemistry; Photo- and Radiation Chemistry.

Section B: Selected Topics in Polymer Chemistry—Copolymers; Reactive Polymers and Polymeric Reagents; Degradation; Crosslinking.

Section C: Structure and Thermodynamics of Solutions, Gels and Polymer Mixtures—Characterization of Molecular Structure; Solutions, Gels, Polyelectrolyte Systems; Structure and Phase Equilibria in Multicomponent Systems; Phase Boundaries, Dispersion, Nucleation.

Section D: Dynamics of Polymer Systems—Relaxation Phenomena; Inelastic Scattering; Transport Processes; Viscoelasticity and Rheology.

Section E: State of Order and Transition Phenomena—Chain Conformations in Bulk; Glass Transition Phenomena; Crystal Structure, Crystallization and Melting; The Rubbery State.

Section F: Selected Properties and Applications of Polymers—Mechanical Properties, including Large Deformations and Fracture; Electrical, Optical and Magnetic Properties; Medical and Biological Applications; New Developments.

The following scientists have accepted to present plenary and main lectures:

Plenary Lectures

P. J. FLORY (USA): Molecular Structure, Conformation and Properties of Macromolecules
G. SMETS (Belgium): New Developments and Future of Synthetic Polymer Chemistry

Section Main Lectures

Section A: Synthesis

J. P. KENNEDY (USA): Synthesis, Characterization and Some Properties of Novel Sequential Copolymers
V. A. KABANOV (USSR): Some Novel Aspects on Polymerization Reactions
ST. PENCZEK (Poland): Cationic Ring-Opening Polymerization
A. LEDWITH (UK): New Initiation Systems for Cationic Polymerization
P. SIGWALT (France): Stereochemistry of Ring-Opening Polymerization of Chiral Monomers
F. C. DE SCHRYVER (Belgium): The Role of Excited State Species in Polymer Chemistry

Section B: Selected Topics in Polymer Chemistry

T. SAEGUSA (Japan): Monomer–Monomer Interaction in Spontaneous Initiation and Sequence Regulation in Copolymerization
P. WITTMER (FRG): Kinetics of Copolymerizations
G. MANECKE (FRG): Immobilized Enzymes—Semisynthetic Catalysts
W. H. DALY (USA): Influence of Support Structure on Preparation and Utilization of Polymeric Reagents
F. H. WINSLOW (USA): Recent Studies in Polymer Degradation and Stabilization

Section C: Structure and Thermodynamics of Solutions, Gels and Polymer Mixtures

H.-J. CANTOW (FRG): NMR-Studies on Conformation and Dynamics of Macromolecules with Emphasis on their Configuration
K. DUSEK (Czechoslovakia): Crosslinking and Structure of Polymer Networks
F. G. de GENNES (France): Conformations and Dynamics of Entangled Polymers
W. H. STOCKMAYER (USA): Thermodynamics of Polymer Solutions with Emphasis to the Concentration Dependence
R. KONINGSVELD (Netherlands): Phase Equilibria in Multicomponent Polymer Mixtures
Yu. S. LIPATOW (USSR): Structure and Properties of Surfaces and Interfaces in Polymer Mixtures

Section D: Dynamics of Polymer Systems

- W. PECHHOLD (FRG): Mechanical and Dielectric Investigations of Relaxations in Polymers
G. ALLEN (UK): Inelastic and Quasi-elastic Neutron Scattering from Polymers
R. PECORA (USA): Quasi-elastic Light Scattering from Polymers
A. PETERLIN (USA): Transport Phenomena and Polymer Morphology
J. D. FERRY (USA): Viscoelastic Properties of Dilute Solutions of Flexible and Semi-Rigid Macromolecules
J. KUBAT (Sweden): Stress Relaxation in Solid Polymers

Section E: State of Order and Transition Phenomena

- R. SIMHA (USA): The Solid Polymeric State; Thermodynamic and Relaxational Aspects
H. G. KILIAN (FRG): Thermodynamics of Crystallizing Oligomer and Polymer Multi-component Systems
A. KOVACS (France): A Transparent Phenomenological Approach to Structural Recovery of Glasses
A. J. PENNING (Netherlands): Lamellar and Fibrillar Crystallization of Polymers
H. TADOKORO (Japan): Structure and Properties of Crystalline Polymers
J. E. MARK (USA): Recent Studies of Rubberlike Elasticity

Section F: Selected Properties and Applications of Polymers

- E. H. ANDREWS (UK): Recent Developments in the Fracture of Polymers
N. W. TSCHOEGL (USA): The Mechanical Properties of Two-phase Systems (block copolymers, blends etc.)
G. A. DELZENNE (Belgium): Photocross-linkable Polymeric Systems and their Technical Application
J. KALAL (Czechoslovakia): Interaction of Synthetic Polymers with Components of the Living Material
MEIR WILCHEK (Israel): Polymeric Drug Systems and Affinity Chemotherapy

Those wishing to submit a short communication are kindly asked to do so by submitting an abstract on special form B obtainable from Dr. W. FRITSCHÉ at the address given at the end of this announcement. The Scientific Committee will examine the contributions and will inform the authors in January 1979 if the contributions are accepted or not. The text of accepted contributions (maximum 5 pages) should be typed together with tables, diagrams and references on forms which will be sent to authors by the organizers, to be included in the proceedings of the Symposium. Participants would be provided with a copy of the proceedings at the time of the Symposium. Plenary lectures will be published in *Pure and Applied Chemistry*, the official journal of IUPAC.

Correspondence

Enquiries and correspondence concerning the Symposium should be addressed to Dr. W. FRITSCHÉ, c/o Gesellschaft Deutscher Chemiker, PO Box 90 04 40, D-6000 Frankfurt/Main 90, Federal Republic of Germany. Telephone: (0611) 7 91 73 20.

VII INTERNATIONAL CONGRESS ON CATALYSIS

Tokyo: 30 June–4 July 1980

The Seventh International Congress on Catalysis will be organized in Tokyo by the Chemical Society of Japan and the Catalysis Society of Japan under the sponsorship of IUPAC. The official language of the Congress will be English, although every effort will be made to overcome the communications barrier, for example by arranging the presentation of papers or communications of authors who foresee difficulties on their behalf by a suitably qualified person.

Scientific Programme

The theme of the Congress will be 'New Horizons in Catalysis'. Emphasis will be placed specially on the following topics: (i) Heterogeneous Catalysis—elucidation of its nature and its applications both fundamental and in industry; (ii) Research on the Molecular Aspects of Catalysis—particularly on surfaces as characterized by means of new instrumental techniques; (iii) The Science of Catalyst Preparation—including the heterogenization of metal organic complexes; (iv) Developments of New Catalytic Processes of Technological Importance.

The programme will include plenary lectures, contributed papers and communications. The Organizing Committee would welcome submission of papers of high scientific level within the scope of the Congress. Initial selection of contributed papers will be on the basis of extended abstracts not exceeding 800 words which should be received no later than 31 July 1979. The selection of communications will be made no later than 12 January 1980. Authors will be informed whether or not they should subsequently submit a full paper.

The plenary lectures and the contributed papers will be preprinted in full, whereas the communications will be preprinted in the form of abstracts only. All preprinted material will be distributed to registered participants in advance of the Congress.

Correspondence

Enquiries and correspondence concerning the Congress should be addressed to Prof. Iwao YASUMORI, Seventh International Congress on Catalysis, Department of Chemistry, Tokyo Institute of Technology, Ookayama, Meguro-ku, Tokyo 152, Japan.

PROVISIONAL

**INTERNATIONAL UNION OF
PURE AND APPLIED CHEMISTRY**

PHYSICAL CHEMISTRY DIVISION

COMMISSION ON MOLECULAR STRUCTURE AND SPECTROSCOPY

**RECOMMENDATIONS FOR THE
PRESENTATION OF RAMAN SPECTRA
IN DATA COLLECTIONS**

Prepared for Publication by

| | |
|---------------|--------------|
| J. R. DURIG | W. C. HARRIS |
| G. J. ROSASCO | E. D. BECKER |

Comments on these proposals should be sent within 8 months of Publication to the Secretary of the Commission:

Prof. G. ZERBI
Istituto di Chimica Industriale
del Politecnico
Piazza Leonardo da Vinci 32
20133 Milano
Italy

Comments in languages other than English are encouraged. These may have special significance regarding the eventual publication in various countries of translations of the nomenclature finally approved by IUPAC.

PRESENTATION OF RAMAN SPECTRA IN DATA COLLECTIONS

(RECOMMENDATIONS 1978)

COMMISSION ON MOLECULAR STRUCTURE AND SPECTROSCOPY[†]
Sub-Committee on Infrared and Raman Spectroscopy

INTRODUCTION

These recommendations relate to the Raman spectra of isotropic materials that are intended for permanent retention in data collections. They are a more comprehensive version of the "Recommendations for the Presentation of Raman Spectra for Cataloging and Documentation in Permanent Data Collections" which were published in *Pure and Applied Chemistry* **36**, 277 (1973). The current recommendations are based on a report published by the Ad Hoc Panel on Raman Spectral Data, convened by the Numerical Data Advisory Board of the National Academy of Sciences-National Research Council of the United States (1).

There is a recognized need to establish a set of guidelines for the presentation of Raman spectral data that deal with the format for data presentation and the experimental parameters required to define the spectrum properly. Although these recommendations are directed toward Raman spectra prepared for permanent collections, many of them are also pertinent to spectra presented in journals.

There are a number of different types of phenomena which come under the general category of Raman scattering. These include "normal" Raman scattering, resonance Raman scattering, coherent anti-Stokes Raman scattering, hyper-Raman effect, stimulated Raman scattering, etc. The present recommendations are not intended to encompass all these aspects of the field of Raman scattering, but rather will deal with the presentation of data primarily representing "normal" Raman scattering from isotropic materials. The guidelines define a minimum set of parameters which should be specified. These parameters, or analogous parameters adapted to the particular field of interest, will be necessary for adequate data presentation in many fields of Raman spectroscopy. For example, the parameters presented below should be regarded as a minimal subset of those necessary for the specification of resonance Raman spectra in isotropic materials.

It seems useful to define different classes for spectral data which allow variation in data quality. These classes are defined in analogy to similar infrared data classifications which have been proposed by the Coblentz Society (2,3) and adapted by IUPAC (4).

Critically defined physical data

Spectra in this category are of such high quality that they are acceptable as physical constants of the substances under precisely defined conditions. Specifications for this class are not discussed in this document.

Research quality analytical spectra

Data in this category are those in which the sample and spectrum conform to the best current and commonly practiced Raman spectrometry procedures.

Approved analytical spectra

Data in this category are those for which the sample and spectrum are of sufficient quality for use in the identification of unknown materials.

There are, of course, many other spectra of high quality that cannot be classified into the above categories because certain information is lacking. These may be referred to as Unevaluated Spectra.

[†] Report prepared by J. R. Durig, W. C. Harris, G. J. Rosasco, E. D. Becker

SPECIFICATIONS

The recommendations for parameter specifications are listed in Table I under four categories: (A) Sample, (B) Excitation Source, (C) Raman Spectrometer and (D) Experimental Configuration. The guideline used in the selection and specification of parameters is that all information which is significant to the intended physical or chemical interpretation of the data should be presented. In addition, for research quality analytical data, it is suggested that the information presented should be sufficient to allow some evaluation of the data.

The list of parameters under each category in Table I is generally self-explanatory, but additional discussion of the categories is presented below.

DISCUSSION

A. Sample

The information presented in this category should include sample characteristics which either affect the observed spectrum or make the data more useful. It is extremely important that the structure and purity of the sample be established by accepted independent techniques. In the case of a sample in which there is resonance Raman scattering the spectrum can be very different in appearance from that observed in a normal Raman experiment; an acknowledgement of this resonance and possibly the presentation of the electronic absorption spectrum for the material would be very useful.

It is important to recognize that sample heating caused by the exciting laser beam may be significant. Thus, when a temperature is quoted for the spectrum, a description of the method of measurement should be given (i.e., the temperature of a surrounding heat sink, an internal probe temperature, or a spectroscopically determined temperature), and an estimate of the temperature uncertainty would be useful.

B. Excitation source

It is not normally necessary to present details of the measurement of laser power or the transmission function of the filters. The intent of specifications B3 and B4 is to allow a reliable judgement of the power and/or irradiance levels used to perform the experiment.

C. Raman spectrometer

Selection of the optimum value of spectral slit width in terms of signal level and resolution is left to the discretion of the scientist. As a general rule the scan rate ($\text{cm}^{-1}/\text{sec}$) should not exceed the value of the ratio of the spectral slit width (cm^{-1}) to 4 times the value of the time constant (sec), i.e.,

$$\text{Scan rate } \left(\frac{\text{cm}^{-1}}{\text{sec}} \right) \leq \frac{\text{Spectral slit width } (\text{cm}^{-1})}{4 \times \text{time constant (sec)}}$$

In this context, the time constant is defined as the $1/e$ -time of the electronics, i.e., the time for the recording system to reach a value of $(1 - 1/e)$ for a unit step function input. The spectral slit width is operationally defined as the full width (in cm^{-1}) at half height of the peak observed as the spectrum of a "narrow line source" (e.g., a laser plasma line).

For Research Quality Analytical spectra, the spectral slit width should be determined by actual measurement. For Approved Analytical spectra, this information may be obtained from a calculation utilizing the linear dispersion and mechanical slit width of the instrument or from the manufacturer's specifications. Any significant variations of the spectral slit width over the range of the Raman spectrum should also be specified.

The parameters describing response presented in C6 are important in determining the relative "intensity" of a series of bands covering a fairly broad frequency range in the Raman spectrum of a material. The term "system" is meant to include the effects of both the spectrometer and the detector. "Relative response function" can be defined in the context of a calibration utilizing a broad band, continuous standard light source. It is quite feasible to extract useful information on the response of the system by recording the Raman spectrum of a defined standard material.

D. Experimental configuration

It is recommended (D1) that the scattering geometry and the sample cell orientation be described by reference to some conveniently defined orthogonal axis system. This axis system in many cases might be defined by axes parallel to the optical axis of the fore-optics and/or spectrometer, the long direction of the entrance slit, and a third direction perpendicular to these two. This form of specification (D1) is preferred to traditional descriptions (i.e., back scattering, transverse illumination, etc.)

TABLE I. Parameters recommended for the specification of Raman spectral data.

| Type of parameter | Research Quality Analytical Spectra | Approved Analytical Spectra |
|---|-------------------------------------|---|
| <u>A. Sample</u> | | |
| 1. Name and structural formula | Specify | Specify |
| 2. a. State, e.g., gas, liquid, solid (powder, etc.), solution (solvent and concentration) | Specify | Specify |
| b. Color (if any), reference to an absorption spectrum | Specify absorption spectrum | Specify color |
| 3. Impurities | No impurity bands evident | Impurity bands acceptable if identified |
| 4. Temperature (Kelvin, K) | Specify | Specify |
| 5. Pressure, if other than ambient | Specify | Specify |
| <u>B. Excitation source</u> | | |
| 1. Type of laser | Specify | Specify |
| 2. Wavelength (nanometers, nm) | Specify | Specify |
| 3. Laser power (watts, W) | | |
| a. at laser | Specify | Specify |
| b. at sample | Specify | ... |
| 4. Optical elements in beam | | |
| a. Narrow band filter, attenuators, etc. | Specify | Specify |
| b. Effective aperture and focal length of laser focusing lens | Specify | ... |
| <u>C. Raman spectrometer</u> | | |
| 1. Spectrometer manufacturer and model (or equivalent description) | Specify | Specify |
| 2. Detector characteristics, e.g., response type or manufacturer and model | Specify | Specify |
| 3. Spectral slit width at the exciting wavelength (cm^{-1}) | Specify | Specify |
| 4. Scan rate ($\text{cm}^{-1}/\text{sec}$) | Specify | Specify |
| 5. Time constant of recording electronics (sec) | Specify | Specify |
| 6. System response as a function of Raman shift | | |
| a. Relative response function | Specify either | ... |
| b. Demonstrate by reference to a "standard" compound | a or b | Specify |
| <u>D. Experimental configuration</u> | | |
| 1. Scattering geometry specified with respect to a set of orthogonal axes | Specify | Specify |
| 2. Sample cell | Specify | Specify |
| 3. Special arrangements; e.g., spinning sample, multipass irradiation (approximate enhancement) | Specify | Specify |
| 4. Polarization measurements | | |
| a. Specify X(Y,Y)Z for experiments used to determine mode symmetry or measure depolarization ratio (see Fig. 1) | Specify | Specify |
| b. Optical elements; e.g., polarizer, scrambler | Specify | Specify |
| c. Solid angle of collection lens | Specify | ... |

Item 4a recommends that the experimental geometry [X(Y,Y)Z] employed to determine mode symmetry by the measured depolarization ratios can be more generally specified by a symbol $k_i(e_i,e_s)k_s$.⁵ The vector $k_i(k_s)$ refers to the direction of propagation of the incident (scattered) light, and the vector $e_i(e_s)$ refers to the direction of electric field polarization of the incident (scattered) light. These vectors should be referred to a convenient orthogonal axis system. This system will generally be identical to the system defined in D1, but in any case should be easily relatable to the system defined in D1. This form of specification (D4a) is preferred to traditional names such as parallel and perpendicular or horizontal and vertical, etc.

For the purposes of this document the depolarization ratio will be defined in a restricted, operational sense. Two separate spectra are measured, corresponding to the following geometries (see Fig. 1):

$$k_i(e_i,e_s)k_s = X(Y,Y)Z$$

$$k_i(e_i,e_s)k_s = X(Y,X)Z$$

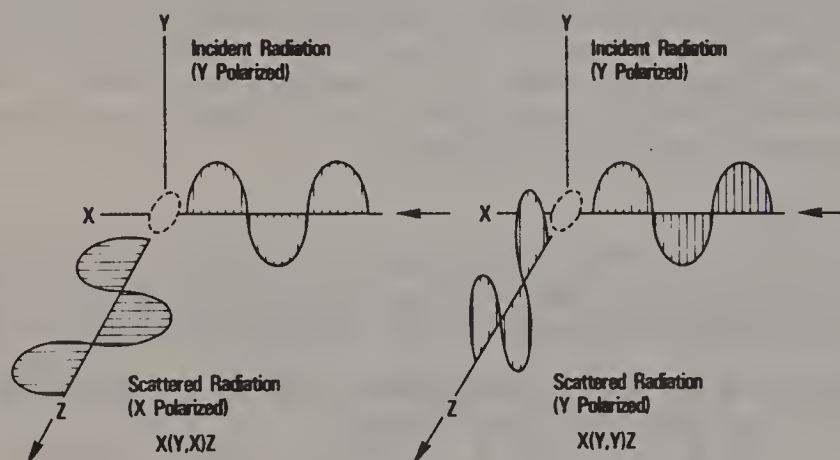


Figure 1. Geometry involved in the measurement of depolarization ratios. (A left-handed coordinate system is used here for ease of visualization but is not recommended for general use.)

This experiment implies that the incident light is linearly polarized and that the scattered light is polarization-analyzed to select the necessary components. Further, the polarization dependence of the system response (C7) must be eliminated by a suitable optical technique (e.g., use of a scrambler plate) or a correction applied to the recorded spectra. The ratio of the suitably corrected peak height or the integrated area of a band observed in experiment X(Y,X)Z to that observed in experiment X(Y,Y)Z is defined as the depolarization ratio, i.e.,

$$\rho = \frac{I[X(Y,X)Z]}{I[X(Y,Y)Z]}$$

This quantity is useful for assigning mode symmetries and for verification of structural formula and chemical identification. The technique is recommended for routine measurement of depolarization ratios for analytical purposes.

SPECTRAL FORMAT

Within the context of these recommendations the most important spectral information involves the frequency shifts, relative "intensity," and depolarization ratio (related to the vibrational symmetry type) of the Raman bands of the material.

A. Graphical presentation

It is necessary that a graphical presentation of the spectrum be made for both Research Quality and Approved Analytical Spectra. The format for this presentation is as follows:

Abcissa - This should be linear in wavenumber shift, zero at the right, with the wavenumber shift increasing from right to left. The accuracy of the wavenumber scale should be not less than $\pm 5 \text{ cm}^{-1}$ for Approved Analytical data and $\pm 2 \text{ cm}^{-1}$ for Research Quality Analytical data. Note that the wavenumber units are defined only in vacuo; however, the accuracy required is not so stringent, in general, as to require a differentiation between reciprocal wavelength in vacuo and in air.

Ordinate - This should be linear and proportional to the intensity (power) of the Raman signal, increasing upwards. The units of the intensity scale should be actually observed photocurrent or count rate or an equivalent measurement. This intensity scale will be more significant when a "standard" spectrum is defined. The amount of any suppression of the "zero" light level should be stated.

B. Depolarization ratio

Research Quality Analytical data should present the two spectra utilized in the determination of the depolarization ratio such that the two spectra may be easily compared and the approximate values of the ratio are graphically evident. It is suggested that the two spectra be superimposed on a single chart if this does not detract from the clarity of the presentation. This presentation is also urged for Approved Analytical data.

C. Tables of Raman data

It is required for Research Quality Analytical data and urged for Approved Analytical data that the information on frequency shift, intensity relative to a specified feature of the spectrum or to some other reference signal, and depolarization ratio be presented for the principal bands of the spectrum in a table accompanying the spectral chart. For Approved Analytical Data the numerical values of the depolarization ratio of the principal bands should be presented on the spectral chart if not included in a table. The method of calculation of the depolarization ratio, i.e., peak height or band area ratios, and any dependence on exciting wavelength should be specified.

D. Spectral data catalogs

It is urged that the format for the presentation of spectral data catalogs be in reasonable and practical agreement with the format previously summarized in part A. There are additional specific recommendations applying to such catalogs as follows:

1. The spectrum should show the date of measurement and, if the spectrum is a part of a compilation, the name of the contributing laboratory.
2. The Raman format should agree with the infrared format; i.e., a 2:1 scale compression in the abscissa above 2000 cm^{-1} .
3. A minimum ratio of the maximum of the strongest band in the spectrum to the peak-to-peak noise at the "baseline" should be 100:1 or better.
4. The intensity unit of the ordinate may be selected such that the strongest bands are off scale by a factor not exceeding 1000 if this is necessary to obtain a satisfactory record of the weaker significant bands. The strongest bands should then be rescanned at an appropriately reduced intensity unit with the specific reduction ratio indicated in the chart.

REFERENCES

- (1) *Applied Spectroscopy* 30, 20 (1976).
- (2) *Anal. Chem.* 38, No. 9, 27A (1966).
- (3) *Anal. Chem.* 47, No. 11, 945A (1975).
- (4) *IUPAC Information Bulletin*, No. 50 (1976).
- (5) T. C. Damen, S.P.S. Porto and B. Tell, *Phys. Rev.* 142, 570 (1966).

PROVISIONAL

**INTERNATIONAL UNION OF
PURE AND APPLIED CHEMISTRY**

INORGANIC CHEMISTRY DIVISION

COMMISSION ON NOMENCLATURE OF INORGANIC CHEMISTRY

**NOMENCLATURE OF HYDRIDES OF
NITROGEN AND DERIVED CATIONS,
ANIONS AND LIGANDS**

Prepared for Publication by
J. CHATT

Comments on these proposals should be sent within 8 months of Publication to the Secretary of the Commission:

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Comments in languages other than English are encouraged. These may have special significance regarding the eventual publication in various countries of translations of the nomenclature finally approved by IUPAC.

THE NOMENCLATURE OF HYDRIDES OF NITROGEN
AND DERIVED CATIONS, ANIONS AND LIGANDS

IUPAC COMMISSION ON NOMENCLATURE OF INORGANIC CHEMISTRY

0.0 Preamble

The nomenclature of hydrides of nitrogen and derived cations, anions and ligands presents particularly difficult problems. The simple hydrides and many of their derivatives are commercial chemicals with well established non-systematic trivial and abbreviated names. The hydrides are inorganic but their most numerous derivatives are organic, and the nomenclature proposed must be compatible with additive (inorganic) and substitutive (organic) nomenclature. It must also be in accord with present trends towards more systematic nomenclature.

The proposed rules have been formulated after some 6 years of discussion and adjustment at annual meetings of the Commission on the Nomenclature of Inorganic Chemistry (CNIC) together with a representative of the Commission on the Nomenclature of Organic Chemistry. They are not perfect, but provide a compromise between existing names, future trends, and inorganic and organic nomenclature practices.

The systematic names are based on organic principles and the hydride name 'azane' where there is hydrogen to be substituted, and on the name of the element, nitrogen, where there is no hydrogen or only 'acidic hydrogen'. It is not proposed that these names should take precedence at present over the well established names for the common hydrides and common derivatives, but with the trend towards systematic nomenclature they may do so in the future. For this reason, the trivial names and non-systematically but well established derived names are described as 'for present use' or 'preferred at the present time' rather than as 'preferred'. It is left to future usage to decide final preference.

1.0 Hydrides of nitrogen, and derived cations, anions and ligands

1.1 Hydrides

The hydrides are named systematically as listed below. Other names given in the list are used, but systematic names are preferred particularly for naming derivatives. According to Rule 2.3* ammonia and hydrazine are recognised exceptions. The names printed in capitals are the most widely accepted. They, and names derived from them by the following rules, are retained for present use.

| | <u>Systematic name</u> | <u>Common name</u> | <u>Others in use</u> |
|----------------------------|------------------------|--------------------|----------------------|
| (a) NH_3 | azane | AMMONIA | |
| (b) N_2H_4 | diazane | HYDRAZINE | |
| (c) N_2H_2 | DIAZENE | diimide | diimine |
| (d) HN_3 | hydrogen trinitride | HYDROGEN AZIDE | hydrazoic acid |

* Rules referred to without other references are taken from Nomenclature of Inorganic Chemistry, 2nd Edn. Publ. Butterworths, London, 1971. Rules prefixed A, B, or C are taken from Nomenclature of Organic Chemistry Sections A, B, or C respectively, Publ. Butterworths, London, 1965. Rules prefixed IN are taken from the present publication.

1.2 Cations derived by the addition of a proton or protons to the hydride or dinitrogen

These cations are named by adding 'ium' to the hydride name with elision of the final 'e' of the hydride name before 'i', except (f), (g) below, and that NH_4^+ is called 'ammonium' (Rule 3.151 and 3.153, C-82.1, C-82.2). Systematic substitutive names are given in column (A), and names preferred for present use in column (B). One unit of charge need not be indicated in the name but if necessary it may be indicated by the Ewens-Bassett system (Rule 3.17). Two units of charge must be indicated. This is done either by the addition of the Ewens-Bassett number or by the use of the infix 'di' between the hydride name and 'ium'.

| | (A) | (B) |
|---------------------------------|----------------------------------|--------------------------------------|
| (a) NH_4^+ | azanium | ammonium |
| (b) N_2H_5^+ | diazanium | hydrazinium |
| (c) $\text{N}_2\text{H}_6^{2+}$ | diazanediium or diazanium(2+) | hydrazinium(2+) or hydrazinediium |
| (d) N_2H_3^+ | diazenium | diazenium |
| (e) $\text{N}_2\text{H}_4^{2+}$ | diazenediium or diazenium(2+) | diazenium(2+) or diazenediium |
| (f) N_2H^+ | diazynium | diazynium |
| (g) $\text{N}_2\text{H}_2^{2+}$ | diazynediium or diazynium(2+) | diazynium(2+) or diazynediium |

1.3 Anions derived by the loss of a proton or protons from the hydrides

These anions are named by replacing the final 'e' of the hydride name by 'ide', except those derived from ammonia (Rule 3.21), hydrazine (Rule 3.221) or hydrogen azide (Rule 3.221) (see examples below). Nitride is systematically derived from the name of the element (Rule 3.21). Substitutive names derived consistently from the systematic names or from retained common names, except where substitutive names are not needed, are given in column (A) and commonly used names retained for present use in column (B).

The charge need not be shown when the anion contains only one nitrogen atom and obeys the octet rule or when it carries only one charge. Otherwise two or more units of charge must be indicated either by the Ewens-Bassett system or, when the anion contains replaceable hydrogen, also by the insertion of numerical infixes 'di', 'tri', etc. between the hydride name and 'ide'.

| | (A) | (B) |
|---------------------------------|---|---------------|
| (a) NH_2^- | azanide | amide |
| (b) NH^{2-} | azanediide azanide(2-) | imide |
| (c) N^{3-} | nitride* | nitride |
| (d) N_2H_3^- | diazanide hydrazinide | hydrazide |
| (e) $\text{N}_2\text{H}_2^{2-}$ | diazanediide or diazanide(2-) or hydrazinediide or hydrazinide(2-) | hydrazide(2-) |

* For footnote see next page.

| | | | |
|-----|---------------------------|---|---------------|
| (f) | N_2H^{3-} | diazanetriide or diazanide(3-) or hydrazinetriide or hydrazinide(3-) | hydrazide(3-) |
| (g) | N_2^{4-} | dinitride(4-)* | dinitride(4-) |
| (h) | N_2H^- | diazenide | diazenide |
| (i) | N_2^{2-} | dinitride(2-)* | dinitride(2-) |
| (j) | N_3^- | trinitride(1-)* | azide |

Examples

| | | |
|---|---|-------------------------------------|
| 1 | NaNH_2 | sodium amide |
| 2 | $\text{Hg}_2\text{I}(\text{NH})(\text{OH})$ | dimercury hydroxide imide iodide |
| 3 | Li_3N | lithium nitride |
| 4 | $\text{Na}[\text{N}_2\text{H}_3]$ | sodium hydrazide |

1.4 Ligands derived from the nitrogen hydrides

There is generally no ambiguity or difficulty in naming these ligands in Main Group metal complexes where the bonding situation is well defined. In transition metal complexes the ligand is often intermediate between formal valence bond states, and the formal oxidation state of the metal is not defined. Thus the N_2H_3 ligand may be regarded formally as $\text{NH}_2\text{-NH}^-$ (carrying one negative charge) or NH=NH_2^+ (carrying one positive charge). In Main Group element compounds, conventional ideas regarding valency or formal oxidation states normally lead to an unequivocal choice of names based on valence bond structures. In transition metal compounds no unequivocal choice may be possible and an arbitrary choice must be made for nomenclature purposes. It is important for indexing and information retrieval purposes that the ligand should always have the same name regardless of whether conventional oxidation state ideas dictate otherwise.

The following order of priorities is used to determine the ligand name.

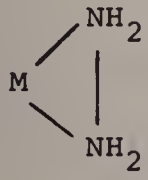
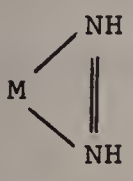
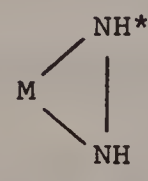
- (1) If possible name the ligand as a neutral molecule which is not a zwitterion, nor a radical, nor a diradical.
- (2) If (1) is impossible, name it as an anionic ligand with the smallest possible formal charge.
- (3) If it cannot be named according to (1) or (2), name it as a zwitterionic ligand with a total formal charge of zero or failing that one with the smallest possible negative charge.
- (4) If none of the above is possible, name the ligand as a cationic ligand.

* Because these anions contain no replaceable hydrogen, substitutive names are not needed, and those derived from the name of the element are preferred. The substitutive names would be: (c) azanetriide, (g) diazanetetraide, and (i) diazenediide; (j) has no approved substitutive name.

Some ligands derived from the dinitrogen skeleton have as many as three systematic names depending on the 'parent' chosen for their derivation. Application of the above rules limits the choice to one parent for each N_2H_x ($x = 0$ to 5) ligand as listed in Table 1. The preferred names for the derivation of ligand names are given in capital letters.

1.41 The nitrogen hydrides and their cations as ligands

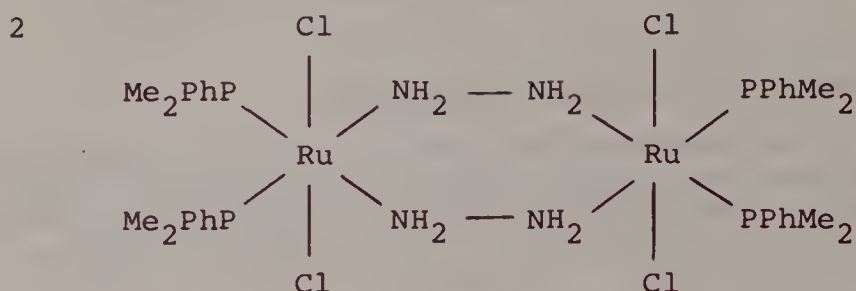
The ligand names are the same as those of the hydrides and cations from which they are derived except that 'ammonia' gives the ligand name 'ammine'. The points of attachment of the ligand are indicated by suffixing the italicised symbols of the ligand atom or atoms to the name of the ligand (Rule 7.34). Ligands in their different bonding situations are given below, (M = metal).

- | | | |
|-----|--|-------------------------------|
| (a) | $M-NH_3$ | ammine |
| (b) | $M-NH_2-NH_2$ | hydrazine- <u>N</u> |
| (c) |  | hydrazine- <u>N,N'</u> |
| (d) | $M-NH_2-NH_3^+$ | hydrazinium |
| (e) | $M-NH=NH$ | diazene- <u>N</u> |
| (f) |  or  | diazene- <u>N,N'</u> |
| (g) | $M-NH_2-NH_2-M$ | μ -hydrazine- <u>N,N'</u> |
| (h) | $M-NH=NH-M$ | μ -diazene- <u>N,N'</u> |
| (i) | $M-N_3H$ | (hydrogen azide) |

* According to Rule IN-1.4 these two valence bond structures are given the same name.

Examples

1 $[\text{Cu}(\text{NH}_3)_4] \text{SO}_4$ tetraamminecopper(II) sulfate



c,d,i,j-tetrachloro-a,b,k,l-tetrakis(dimethylphenylphosphine)
-e,f,g,h-di(μ -hydrazine-N,N')-diruthenium(II) *
di(μ -hydrazine-N,N')-bis[dichloro(dimethylphenylphosphine)-
ruthenium(II)]

3 $[\text{WBr}_2(\text{NH}=\text{NH})(\text{Ph}_2\text{PCH}_2\text{CH}_2\text{PPh}_2)_2]$
dibromo(diazene-N)bis{ethylenebis(diphenylphosphine)}-
tungsten(II) **

4 $[\eta-(\text{C}_5\text{H}_5)(\text{CO})_2\text{Mn}-\text{NH}=\text{NH}-\text{Mn}(\text{CO})_2\eta-(\text{C}_5\text{H}_5)]$
tetracarbonylbis(η -cyclopentadienyl)-(μ -diazene-N,N')-dimanganese
(μ -diazene-N,N')-bis(dicarbonyl- η -cyclopentadienylmanganese)

1.42 Ligands formally derived from the nitrogen hydrides by the loss of a proton or protons

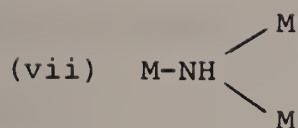
These ligands have the same formulae as the anions. Their names are systematically derived from those of the corresponding anions by replacing the final 'e' of the anion name by 'o'. The point of attachment of the ligand to the metal is indicated according to Rule 7.34. When alternative derivations are possible make a choice according to Rule IN-1.4.

(a) From ammonia

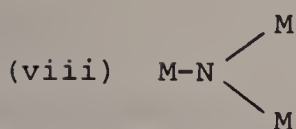
| | | |
|-------|---------------------------------|----------------|
| (i) | $\text{M}-\text{NH}_2$ | amido |
| (ii) | $\text{M}=\text{NH}$ | imido |
| (iii) | $\text{M}\equiv\text{N}$ | nitrido |
| (iv) | $\text{M}-\text{NH}_2-\text{M}$ | μ -amido |
| (v) | $\text{M}-\text{NH}-\text{M}$ | μ -imido |
| (vi) | $\text{M}-\text{N}-\text{M}$ | μ -nitrido |

* Locant designators a, b, c etc. have been assigned by a logical extension of Rule 7.613 to bridging ligands with two points of attachment, one to each of two central metal atoms.

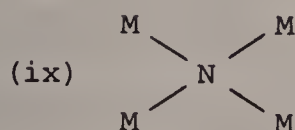
** The ditertiary phosphine ligand may also be named 1,2-bis(diphenylphosphino)ethane.



μ_3 -imido

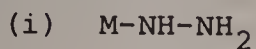


μ_3 -nitrido

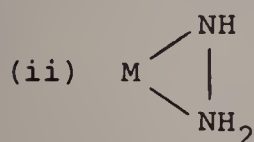


μ_4 -nitrido

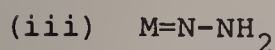
(b) From hydrazine



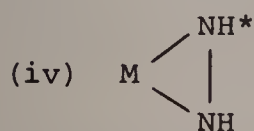
hydrazido(1-)-N



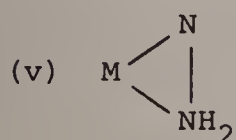
hydrazido(1-)-N,N'



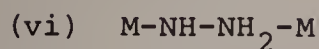
hydrazido(2-)-N



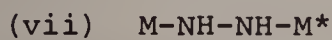
diazene-N,N'



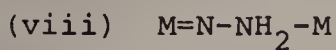
hydrazido(2-)-N,N'*



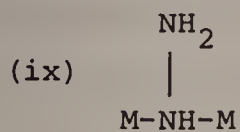
μ -hydrazido(1-)-N,N'



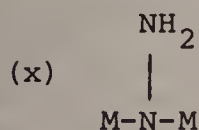
μ -diazene-N,N'



μ -hydrazido(2-)-N,N'

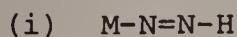


μ -hydrazido-N

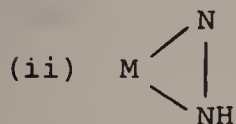


μ -hydrazido(2-)-N

(c) From diazene**



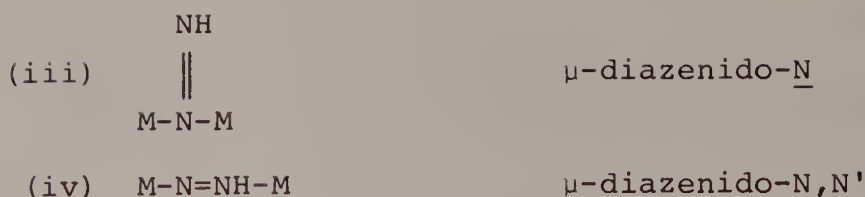
diazenido-N



diazenido-N,N'

* Symmetrical hydrazido(2-) and all hydrazido(3-) ligands are named as derived from diazene (Rule IN-1.41 and IN-1.42c). For the ligand obtained by stripping all hydrogen atoms from hydrazine see Rule IN-1.42(c).

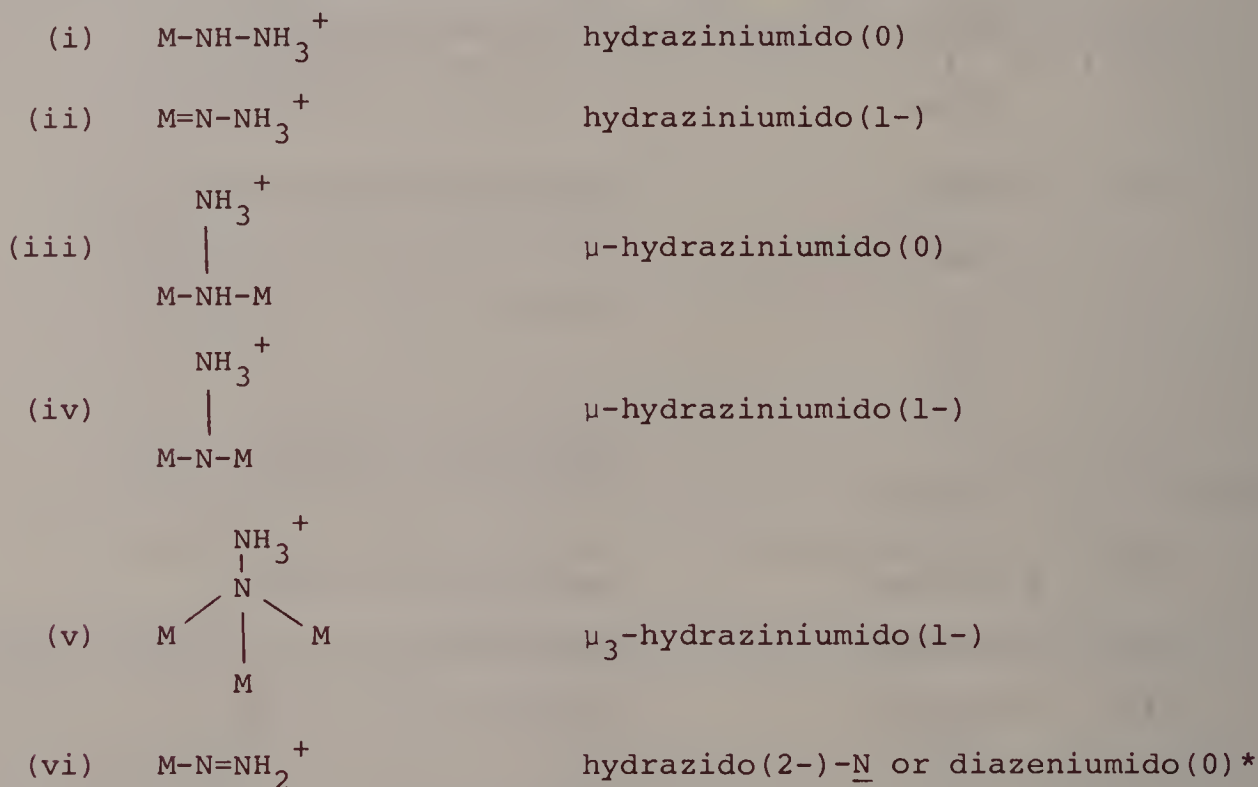
** See also examples marked * under (b) above.



The ligand obtained by stripping all the hydrogen atoms from hydrazine or diazene may be called 'dinitrogen', 'dinitride(2-)' or 'dinitride(4-)' according to its formal charge. In the absence of firm evidence otherwise the name 'dinitrogen' is used (see Rule IN-1.4).

1.43 Ligands derived from the nitrogen hydride mono-cations by loss of a proton or protons from the uncharged nitrogen centre

These are named by adding the suffix 'ido' to the cation name. The Ewens-Bassett system is used to indicate the total formal charge on the ligand, including zero and one unit of negative charge.



1.5 Organic derivatives of the nitrogen hydride ligands

These are named using substitutive nomenclature and designating the nitrogen atoms $\underline{\text{N}}^1$ (or $\underline{\text{N}}$) and $\underline{\text{N}}^2$ (or $\underline{\text{N}}'$) (Rule C-921.1). The $\underline{\text{N}}^1$ (or unprimed $\underline{\text{N}}$) refers to the nitrogen which in accord with the preferred ligand name (Rule IN-1.4) carries a formal positive charge (e.g. (d) under Rule IN-1.41). If neither carries a formal positive charge the $\underline{\text{N}}^1$ (or unprimed $\underline{\text{N}}$) designates the formally anionic nitrogen, usually attached to the metal. If the nitrogen atoms carry equal formal charges or are both formally neutral the $\underline{\text{N}}^1$ (or unprimed $\underline{\text{N}}$) designates the most highly substituted nitrogen atom. The metal is not regarded as a substituent for this purpose. For more complicated substitution see Rule C-921 of the Nomenclature of Organic Chemistry.

* The ligand $-\text{N}=\text{NH}_2^+$ and other diazenium ligands are normally named as hydrazine derivatives according to Rule IN-1.4 [see example (iii) Rule IN-1.42(b)].

Examples of linkage

| | |
|-------------------------------|--|
| $M-N=N-C_6H_5$ | 2-phenyldiazenido- \underline{N}^1 |
| $M=N-N(CH_3)_2$ | 2,2-dimethylhydrazido(2-)- \underline{N}^1 |
| $M-N(CH_3)=N(C_2H_5)$ | 1-ethyl-2-methyldiazene- \underline{N}^2 |
| $M-N(CH_3)-N(C_2H_5)(C_3H_7)$ | 2-ethyl-1-methyl-2-propylhydrazido- \underline{N}^1 |
| $M-N(CH_3)-N(CH_3)_2H^+$ | 1,1,2-trimethylhydraziniumido(0)- \underline{N}^2 |
| $M-NHCH_3-N(CH_3)_2$ | 1,1,2-trimethylhydrazine- \underline{N}^2 |
| $M-NH=N(CH_3)-M$ | μ -2-methyldiazene- $\underline{N}^1, \underline{N}^2$ |

Examples

- (1)
$$\begin{array}{c} P(C_2H_5)_3 \\ | \\ Cl-Pt-N=N-Ph \\ | \\ P(C_2H_5)_3 \end{array}$$
 trans-chloro(2-phenyldiazenido- \underline{N}^1)-bis(triethylphosphine)platinum(II)
- (2)
$$\left[\begin{array}{c} P(C_2H_5)_3 \\ | \\ Cl-Pt-NH=NPh \\ | \\ P(C_2H_5)_3 \end{array} \right] Cl$$
 trans-chloro(1-phenyldiazene- \underline{N}^2)-bis(triethylphosphine)platinum(II) chloride
- (3) $[WBr_2\{=N-N(CH_3)_2\}\{(C_6H_5)_2PCH_2CH_2P(C_6H_5)_2\}_2]$
dibromo(2,2-dimethylhydrazido(2-)- \underline{N}^1)bis[ethylenebis(diphenylphosphine)]tungsten(IV)

TABLE 1. Names* of nitrogen hydrides, neutral molecular cations, anions and zwitterions derived from the N-N skeleton

| <u>Stoichiometric Formula</u> | <u>Parent Molecule Hydrazine</u> | <u>Parent Molecule Diazene</u> | <u>Parent Molecule Dinitrogen</u> (Common name nitrogen) |
|-----------------------------------|--|------------------------------------|---|
| N ₂ H ₆ | NH ₃ ⁺ -NH ₃ ⁺ | hydrazinium(2+) hydrazinediium | |
| N ₂ H ₅ | NH ₂ ⁺ -NH ₃ ⁺ | HYDRAZINIUM | |
| N ₂ H ₄ | NH ⁻ -NH ₃ ⁺ | HYDRAZINIUMIDE(0) | |
| N ₂ H ₃ | N ²⁻ -NH ₃ ⁺ | HYDRAZINIUMIDE(1-) | |
| N ₂ H ₄ | NH ₂ ⁻ -NH ₂ | HYDRAZINE | diazenium(2+) diazenediium |
| N ₂ H ₃ | NH ⁻ -NH ₂ | HYDRAZIDE hydrazinide | diazenium |
| N ₂ H ₂ | N ²⁻ -NH ₂ | HYDRAZIDE(2-) hydrazinediide | diazeniumide(0) |
| N ₂ H ₂ | NH ⁻ -NH ⁻ | hydrazide(2-) hydrazinediide | DIAZENE |
| N ₂ H | N ²⁻ -NH ⁻ | hydrazide(3-) hydrazinetriide | DIAZENIDE |
| N ₂ | N ²⁻ -N ²⁻ | dinitride(4-) | dinitride(2-) |
| | | N ⁻ =N ⁻ | N≡N |
| | | | NH ⁺ ≡NH ⁺ |
| | | | diazynediium diazynium(2+) |
| | | | diazynium |
| | | | DINITROGEN |

* The ligand name is derived from the form given in capitals (see Rule IN-1.4).

CALENDAR OF IUPAC-SPONSORED MEETINGS

1978

| | | |
|----------------------------|--|--------------------------------|
| September 25– October 2 | International Symposium on Frontiers in Bioorganic Chemistry and Molecular Biology (Prof. Yu. A. OVCHINNIKOV, Shemyakin Institute of Bioorganic Chemistry, USSR Academy of Sciences, Ul. Vavilova 32, Moscow 117312, USSR) | Tashkent & Moscow (USSR) |
| October 17–21 | International Symposium on Macromolecular Chemistry (Prof. K. A. ANDRIANOV, Polymer Scientific Council, Academy of Sciences of USSR, Vavilov Street 32, 117312 Moscow, USSR) | Tashkent (USSR) |
| October 29– November 3 | World Conference on Vegetable Food Protein (Dr. A. R. BALDWIN, American Oil Chemists' Society, 508 South Sixth Street, Champaign, Illinois 61820, USA) | Amsterdam (Netherlands) |
| December 5–8 | UNESCO International Symposium on University–Industry Interactions in Chemistry (Dr. I. ENEBERG, Division of Scientific Research and Higher Education, United Nations Educational, Scientific and Cultural Organization, 7 place de Fontenoy, F-75700 Paris, France) | Toronto (Canada) |

1979

| | | |
|-----------------|--|--------------------------------|
| June 12–16 | VI International Conference on Solid Compounds of Transition Elements (Prof. A. RABENAU, Max-Planck-Institut für Festkörperforschung Stuttgart, Heisenbergstrasse 1, D-7000 Stuttgart 80, Federal Republic of Germany) | Stuttgart (FRG) |
| July 1–6 | XXI Colloquium Spectroscopicum Internationale (Mr. K. M. BILLS, European Research and Development Centre, Inco Europe Ltd., Wiggins Street, Birmingham B16 0AJ, UK) | Cambridge (UK) |
| July 2–5 | V Conference on Modified Polymers, Their Preparation and Properties (Dr. A. ROMANOV, Slovak Academy of Sciences, Dubravska Cesta, Bratislava, Czechoslovakia) | Bratislava (Czechoslovakia) |
| July 9–12 | 19th Prague Microsymposium on Macromolecules: Mechanisms of Degradation and Stabilization of Hydrocarbon Polymers (Dr. P. ČEFELÍN, PMM Secretariat, Institute of Macromolecular Chemistry, 1888 Petřiny, Prague 6, Czechoslovakia) | Prague (Czechoslovakia) |
| July 16–19 | 20th Prague Microsymposium on Macromolecules: Microcalorimetry of Macromolecules (Dr. P. ČEFELÍN, PMM Secretariat, Institute of Macromolecular Chemistry, 1888 Petřiny, Prague 6, Czechoslovakia) | Prague (Czechoslovakia) |
| August 12–18 | 8th International Mass Spectrometry Conference (Dr. O. H. J. CHRISTIE, Laboratory for Mass Spectrometry, University of Oslo, PB 1048 Blindern, Oslo 3, Norway) | Oslo (Norway) |
| August 20–25 | International Conference on Surface and Colloid Chemistry (Prof. S. FRIBERG, Department of Chemistry, 142 Chemistry Building, University of Missouri–Rolla, Rolla, Missouri 65401, USA) | Stockholm (Sweden) |
| August 27–31 | 27th IUPAC Congress (Dr. J. LARINKARI, Kemian Helsinki Keskusliito, POB 13028, Fabianinkatu 7B, SE-00131 Helsinki 13, Finland) | Helsinki (Finland) |

| | | |
|--------------------|--|------------------------------------|
| August 29–31 | 4th IUPAC Symposium on Mycotoxins and Phycotoxins (Prof. P. KROGH, Department of Veterinary Microbiology, School of Veterinary Medicine, Purdue University, West Lafayette, Indiana 47907, USA) | Lausanne (Switzerland) |
| September 3–7 | 9th International Conference on Organometallic Chemistry (Prof. P. TIROUFLET, Laboratoire de Polarographie Organique, Faculté des Sciences 'Gabriel', Université de Dijon, 6 Boulevard Gabriel, F-21000 Dijon Cédex, France) | Dijon (France) |
| September 17–21 | International Symposium on Macromolecules (Prof. R. C. SCHULZ, Organisch-Chemisches Institut, J. J. Becherweg 18–20, D-6500 Mainz, Federal Republic of Germany) | Mainz (FRG) |
| September 17–21 | International Conference on Phosphorus Chemistry 1979 (Prof. G. KEIL, Akademie der Wissenschaften der DDR, Rudower Chaussee 5, GDR-1199 Berlin-Adlershof, German Democratic Republic) | Halle (GDR) |
| 1980 | | |
| July 20–27 | VI International Fermentation Symposium (Prof. J. E. ZAJIC, Faculty of Engineering Science, University of Western Ontario, London, Ontario, Canada N6A 5B9) | London, Ontario (Canada) |
| August 17–22 | V IUPAC Conference on Physical Organic Chemistry (Prof. J. F. BUNNETT, Division of Natural Sciences–II, University of California, Santa Cruz, California 95064, USA) | Santa Cruz, California (USA) |
| | III IUPAC Symposium on Organic Synthesis (Prof. B. M. TROST, Department of Chemistry, University of Wisconsin-Madison, 1101 University Avenue, Madison, Wisconsin 53706, USA) | (USA) |

CALENDAR OF NON-IUPAC MEETINGS

1978

| | | |
|---------------------------|--|----------------------------|
| October 4-11 | 7th International Congress on Metallic Corrosion (Associação Brasileira de Corrosão-ABRACO, Edifício do I.N.T., Av. Venezuela 82/709, 20 000 Rio de Janeiro-RJ, Brazil) | Rio de Janeiro (Brazil) |
| October 31- November 2 | International Conference on Polymer Latex (Mr. R. CRAVEN, Plastics and Rubber Institute, 11 Hobart Place, London SW1W 0HL, UK) | London (UK) |
| November 23-24 | International Conference on Safety in Chemical Plants (Federazione delle Associazioni Scientifiche e Tecniche, Piazzale R. Morandi 2, I-20121 Milano, Italy) | Milan (Italy) |
| December 18-19 | Symposium No. 13 on Pulsed Nuclear Magnetic Resonance in Solids (Prof. J. A. S. SMITH, Department of Chemistry, Queen Elizabeth College, Campden Hill Road, London W8, UK) | London (UK) |

1979

| | | |
|--------------------|---|-----------------------------------|
| March 5-8 | III European Symposium on Vitamin B ₁₂ and Intrinsic Factor (Dr. B. ZAGALAK, Chemisches Laboratorium, KISPI, Universität Zürich, Steinwiesenstrasse 75, CH-8032 Zürich, Switzerland) | Zürich (Switzerland) |
| March 26-29 | II European Surface Science Conference (ECOSS 2) (Mr. P. M. WILLIAMS, V. G. Scientific Ltd., Imberhorne Lane, East Grinstead, Sussex RH19 2HR, UK) | Cambridge (UK) |
| April 2-6 | VI International Vacuum Metallurgy Conference on Special Melting and Metallurgical Coatings (C. F. ELLIOTT, Teledyne-Allvac, POB 759, Monroe, North Carolina 28110, USA) | San Diego, California (USA) |
| June 24- July 3 | 5th International Summer Conference 'Chemistry of Solid/Liquid Interfaces' including the Symposium on Interfacial Phenomena in Colloid Systems (Dr. V. PRAVDIĆ, Centre for Marine Research, 'Rudjer Bošković' Institute, POB 1016, YU-41001 Zagreb, Yugoslavia) | Cavtat/Dubrovnik (Yugoslavia) |
| July 8-14 | 11th International Congress of Biochemistry (Dr. W. A. BRIDGER, Department of Biochemistry, University of Alberta, Edmonton, Alberta T6G 2H7, Canada) | Toronto (Canada) |
| July 9-13 | II International Conference on the Mechanisms of Reactions in Solution (Dr. J. F. GIBSON, The Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK) | Canterbury (UK) |
| July 23-26 | 6th International Symposium on Synthesis in Organic Chemistry (The Chemical Society, Burlington House, London W1V 0BN, UK) | Cambridge (UK) |
| August 20-23 | I European Symposium on Organic Chemistry (ESOC 1) (Gesellschaft Deutscher Chemiker, POB 90 04 40, D-6000 Frankfurt/Main 90, Federal Republic of Germany) | Köln (FRG) |
| September 3-7 | V International Symposium on Glycoconjugates (Dr. R. SCHAUER, Biochemisches Institut Christian-Albrechts-Universität, Otto-Meyerhof-Haus, Olshausenstrasse 40-60, D-2300 Kiel, Federal Republic of Germany) | Kiel (FRG) |

NEW IUPAC PUBLICATIONS

IUPAC COMPENDIUM OF ANALYTICAL NOMENCLATURE "THE ORANGE BOOK"

H.M.N.H. IRVING, *University of Leeds, U.K.*

H. FREISER, *University of Arizona, U.S.A.*

T.S. WEST, *Macaulay Institute for Soil Research, Aberdeen, U.K.*

The IUPAC Analytical Chemistry Division's efforts to secure full recognition and widespread adoption of the recommended symbols and nomenclature applicable to many disciplines of analytical chemistry have now been published in one volume "The Orange Book."

The Index has been prepared with the maximum amount of cross-referencing so that the reader seeking guidance on any particular point of nomenclature can be directed quickly to the relevant report or Reports in which it has been discussed.

Contents (partial): Preamble. Recommendations for the presentation of the results of chemical analysis. Recommendations for terminology to be used with precision balances. Recommended nomenclature for scales of working in analysis. Recommendations on nomenclature for contamination phenomena in precipitation from aqueous solution. Recommended nomenclature for automatic analysis. Recommendations for nomenclature of thermal analysis. Recommendations for nomenclature of mass spectrometry. Recommended nomenclature for titrimetric analysis. Report on the standardization of pH and related terminology. Practical measurement of pH in amphiprotic and mixed solvents. Recommended symbols for solution equilibria. Recommended nomenclature for liquid-liquid distribution. Recommendations on nomenclature and presentation of data in gas chromatography. Recommendations on nomenclature for chromatography. Recommendations on ion exchange nomenclature. Nomenclature, symbols, units and their usage in spectrochemical analysis-I. General atomic emission spectroscopy.

Of interest to: Analytical chemists in a wide range of disciplines.

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| ISBN 0 08 022347 8 f | \$15.00 | £ 8.00 | /R |
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| March 1978 | | | |

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INTERNATIONAL THERMODYNAMIC TABLES OF THE FLUID STATE — 5 METHANE

Editors: S. ANGUS, K.M. de REUCK and B. ARMSTRONG, *IUPAC Thermodynamic Projects Centre, Imperial College of Science and Technology, London*

The Thermodynamic Tables project was inaugurated in 1963 by the Commission on Thermodynamics and Thermochemistry of the Division of Physical Chemistry of the International Union of Pure and Applied Chemistry with the object of compiling internationally agreed values of the equilibrium thermodynamic properties of liquids and gases of interest to both scientists and technologists. The range covered for each fluid is that for which there exist reliable experimental data, and the agreed values are issued as tables upon the basis of which users may produce equations suited to their own special requirements.

Contents: Preface. Introduction. Symbols. Units and conversion factors; experimental results. Two-phase regions. Single-phase region. Ideal gas properties. The equation of state. The IUPAC tables. Limits of the tables. Use and accuracy of the tables. Recommendations for improvements of the tables. **Appendix:** The density of liquid methane in the region of interest in custody transfer calculations.

Of interest to: Physical chemists, mechanical and gas engineers. Scientists involved in the studies of thermodynamics and/or statistical mechanics of fluids, heat and mass transfer, etc.

| | | | |
|--------------------|-------------|--------|----|
| ISBN 0 08 021981 0 | \$40.00 | £20.00 | |
| 276pp | 250 x 176mm | | /R |
| Spring 1978 | | | |

IUPAC Chemical Data Series Number 16



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LIST OF ABBREVIATIONS

| | |
|------------|--|
| AOAC | Association of official Analytical chemists |
| ASTM | American Society for Testing and Materials |
| BIPM | Bureau International des Poids et Mesures |
| CB | IUB–IUPAB–IUPAC Commission on Biothermodynamics |
| CEE | Communauté Européenne Economique |
| CHEMRAWN | IUPAC Committee on Chemical Research Applied to World Needs |
| CNIC | IUPAC Commission on Nomenclature of Inorganic Chemistry |
| CNOC | IUPAC Commission on Nomenclature of Organic Chemistry |
| CODATA | ICSU Committee on Data for Science and Technology |
| COMECON | Council of Mutual Economic Assistance of Communist Nations |
| COWAR | ICSU Scientific Committee on Water Research |
| CTC | IUPAC Committee on Teaching of Chemistry |
| CToCCS | IUPAC Commission on Toxicology in Clinical Chemistry |
| DECHEMA | European Federation of Chemical Engineering |
| EFMC | European Federation for Medicinal Chemistry |
| FAO | UN Food and Agriculture Organization |
| FECS | Federation of European Chemical Societies |
| IARC | WHO International Agency for Research on Cancer |
| ICAG | IUPAC International Company Associates Group |
| ICASE | International Council of Associations of Science Education |
| ICSU | International Council of Scientific Unions |
| ICSU AB | ICSU Abstracting Board |
| ICSU CTS | ICSU Committee on Teaching of Science |
| IDCNS | IUPAC Interdivisional Committee on Nomenclature and Symbols |
| IFCC | International Federation of Clinical Chemistry |
| IMSEG | International Mass Spectrometric Evaluation Group |
| ISE | International Society of Electrochemistry |
| ISO | International Organization for Standardization |
| ISO/TC | ISO Technical Committee |
| IUB | International Union of Biochemistry |
| IUBS | International Union of Biological Sciences |
| IUCr | International Union of Crystallography |
| IUFoST | International Union of Food Science and Technology |
| IUNS | International Union of Nutritional Sciences |
| IUPAP | International Union of Pure and Applied Physics |
| IUPHAR | International Union of Pharmacology |
| JCBN | IUB–IUPAC Joint Commission on Biochemical Nomenclature |
| OECD | Organization for Economic Cooperation and Development |
| <i>PAC</i> | <i>Pure and Applied Chemistry</i> , official Journal of IUPAC |
| PNA | Appendix on Provisional Nomenclature, Symbols, Terminology, and Conventions to <i>IUPAC Inf. Bull.</i> |
| Red Book | IUPAC Rules on Nomenclature of Inorganic Chemistry |
| SAC | Society for Analytical Chemistry (UK) |
| SAIC | IUPAC Subcommittee for Assessment of Isotopic Composition |
| SCOR | ICSU Scientific Committee on Oceanic Research |
| UN | United Nations |
| UNESCO | UN Educational, Scientific, and Cultural Organization |
| UNISIST | UNESCO–ICSU Programme on International Science Information System |
| WHO | UN World Health Organization |

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Information Bulletin

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and Applied Chemistry**

1978, No. 3



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INTERNATIONAL UNION OF PURE and APPLIED CHEMISTRY

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The International Union of Pure and Applied Chemistry (IUPAC), formed in 1919, is a voluntary, nongovernmental, nonprofit association of organizations, each of which represents the chemists of a member country.

Its objectives are:

to promote continuing cooperation among the chemists of the member countries;

to study topics of international importance to pure and applied chemistry which need regulation, standardization, or codification;

to cooperate with other international organizations which deal with topics of a chemical nature;

to contribute to the advancement of pure and applied chemistry in all its aspects.

The membership of IUPAC presently comprises 42 countries, each represented by a national organization, such as an academy of science or research council.

IUPAC INFORMATION BULLETIN

The Bulletin provides a news medium for the various activities of IUPAC, especially of its 60 or so committees. It carries advance information on forthcoming symposia which are to be sponsored by IUPAC together with reports of such meetings which have recently taken place. Coverage is also given to projects in which IUPAC is collaborating with other international organizations.

With effect from 1978 the deliberations of the biennial IUPAC Council meetings will be included in the Bulletin and not be published separately in Comptes Rendus form. Provisional recommendations on nomenclature, symbols, terminology, and conventions, which were issued previously as Appendixes will also be incorporated into the Bulletin for 1978 onwards.

In 1978 three issues of the Bulletin will be published: annual subscription inclusive of postal charges US-\$25.00 (£12.50).

Subscription orders may be placed direct, or through an agent, with IUPAC's official publisher Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 0BW, UK, or with its overseas offices/agencies.

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30th IUPAC GENERAL ASSEMBLY*

Davos: 2–10 September 1979

Details concerning the 30th General Assembly have been distributed to National Adhering Organizations, Associated Organizations, and to Members and National Representatives of IUPAC bodies.

General Information

Davos – named the sun-city in the mountains – lies in a wide open valley in the eastern part of the Swiss Alps at an altitude of 1554 m. It belongs to Europe's leading and best equipped, year-around mountain sports resorts. The area of the Landschaft Davos, as the district is called, covers more than 100 m² and lies right in the middle of one of Switzerland's most popular holiday regions. The climate is renowned for sunshine, dryness of the air and is pleasant and invigorating at all seasons. Originally a summer resort, afterwards a world known health resort, and now a fashionable summer and winter sports resort, it combines the amenities of a town with unspoiled country and scenery.

The average temperature in September is normally around 14°C during the day and 4°C during the night.

Davos consists of two parts, Davos Platz and Davos Dorf, about 3 km apart. The Convention Center, where practically all meetings of the IUPAC General Assembly will take place, is halfway between Davos Platz and Davos Dorf. There is a local bus service between Davos Platz and Davos Dorf.

Visas

Participants from the following countries need a visa to enter Switzerland: Arab Republic of Egypt, Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, India, Poland, Republic of Korea, Romania, Syrian Arab Republic, Taiwan, Union of Soviet Socialist Republics.

IUPAC recommends that applications be made for a visa no later than three months in advance of the Assembly, and if a visa is not granted by one month prior to departure the IUPAC Secretariat should be notified by the applicant without delay.

Accommodation

The Davos Convention Center has negotiated special 'Congress hotel rates' for participants at the General Assembly and it will reserve accommodation for all participants. Individuals may reserve their accommodation directly through the Convention Center, but if a participant is intending to travel on an inclusive or group tour he should request his chosen travel agent to contact the Convention Center directly on his behalf and to whom the travel agent should give the client's name.

Assembly participants travelling by car, train or arranging their own air travel may use the Convention Center for hotel bookings.

Travel

No official travel agent is being appointed by IUPAC.

Official Air Carrier: SWISSAIR – National Airline of Switzerland.

Participants arriving by air at Zürich airport (Kloten) may contact the convention desk of SWISSAIR for further information (travel from Zürich airport to Davos, hotels, latest information on the General Assembly, etc.). There will be a convention desk, bearing the sign 'Welcome to Switzerland', in the hall after leaving the customs area of both Terminals A and B.

To reach Davos from Zürich airport, one may take the airport bus to Zürich railway station, thence by train to Davos.

Schedule of Meetings

Subject to last minute changes the schedule of meetings is as shown in the following pages.

Secretariat

Throughout the Assembly the IUPAC Secretariat will be located in the vicinity of the entrance hall of the Congress House at the Convention Center. The Secretariat will be open daily and provide typing and photocopying services to assist Assembly participants in their work. Any queries concerning the daily organization of the Assembly should be referred to the Secretariat.

Registration will take place in the entrance hall of the Congress House during 14.00–19.00 on 1 September and during 9.00–18.00 daily thereafter.

Social Programme

A social programme for the ladies has been arranged, together with technical visits.

Medical and Dental Service

There is no free national health service in Switzerland. There are a number of private practitioners and a hospital in Davos. Information is given at all hotels and at the information desk at the Convention Center.

Important Telephone Numbers

A telephone service is provided at the Convention Center.

Assembly Information Desk: 37729/36632

Hotel Arrangements: 35812

IUPAC Secretariat: 34714

Lost Property Office: 37729 (Conv. Center)
35812 (Town Hall)

Davos Hospital: 21212

* Attendance is restricted to elected Members of IUPAC bodies, National Representatives, and delegates from Associated Organizations.

SCHEDULE OF MEETINGS FOR 30th IUPAC GENERAL ASSEMBLY (DAVOS)

Sunday, 2 September – Monday, 10 September 1979

Numbers in Parentheses Refer to Meeting Rooms. *Denotes Joint Meeting

| Meeting of | Sunday 2 | Monday 3 | Tuesday 4 | Wednesday 5 | Thursday 6 | Friday 7 | Saturday 8 | Sunday 9 | Monday 10 |
|------------------------------------|---------------------------|---------------------------|--------------|---------------------------|---------------|--------------------------|--------------------------|-------------------------------|---------------------------|
| Council | | | | | | | | 10 – 12.30 14 – 18 (15) | 10 – 12.30 (15) |
| Bureau | | | | | | | 9 – 12 14 – 18 (6) | | 14 – 15 (6) |
| Executive Committee | | | | | | 9 – 12 14 – 18 (6) | | | 15 – 16 (6) |
| Division Presidents | | | | 9 – 12 (30) | | | | | |
| CHEMRAWN Planning Committee | | | | 9 – 13 14 – 18 (28) | | | | | |
| Committee on Publications | 9 – 12 14 – 18 (29) | 9 – 12 14 – 18 (29) | | | | | | | |
| Committee on Teaching of Chemistry | | | | 9 – 12* (1) | | | | | |
| Finance Committee | | | | | | | | | 9 – 12 14 – 17 (28) |

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|--|--|---------------------------------------|--|
| Interdivisional Committee on Nomenclature and Symbols | 9 – 12 14 – 17 (6) | 9 – 12* (1) | 9 – 12 14 – 17 (13) |
| Committee on Chemistry and Industry | | 9 – 12 14 – 17 (Post Hotel) | 10 – 12* (7) |
| Committee on Chemistry and Industry and Subcommittee on New Projects | | | 10 – 12* (7) |
| Committee on Teaching of Chemistry Commissions II.1, II.2, III.1, V.3, IDCNS† | | 9 – 12* (1) | |
| Clinical Chemistry Section | | | |
| Section Committee | 9 – 12.30 14 – 17.30 (14) 18 – 19* (7) | | 9 – 12.30* 14 – 17.30* (14) |
| Commission on Automation | 9 – 12 (3) 14 – 16* (14) | 9 – 12 14 – 16 (3) | 9 – 12.30* 14 – 17.30* (14) |
| Commission on Quantities and Units | 9 – 12.30 14 – 17.30 (34) | 9 – 12.30 (34) 14 – 17* (21) | 9 – 12.30* 14 – 17.30 (34) (14) |

† List of Abbreviations is given on the inside back cover.

Schedule of Meetings for 30th IUPAC General Assembly, Davos: 2–10 September 1979

| Meeting of | Sunday 2 | Monday 3 | Tuesday 4 | Wednesday 5 | Thursday 6 | Friday 7 | Saturday 8 | Sunday 9 | Monday 10 |
|---|---------------|-----------------------|-----------------------|------------------------|---------------------------------|-------------------------------|---------------|-------------|---------------|
| Commission on Teaching | | | 9–12 14–17 (32) | 9–12 14–17 (32) | 9–12 14–17 (32) | 9–12.30* 14–17.30* (14) | | | |
| Commission on Toxicology | | | | 11–13 14–18 (19) | 9–10* 10–13 14–18 (19) | 9–12.30* 14–17.30* (14) | | | |
| Subcommittee on Environmental and Occupational Toxicology of Nickel | | 9–13 14–18 (18) | 9–13 14–18 (18) | 9–11* (18) | | 9–12.30* 14–17.30* (14) | | | |
| Subcommittee on Environmental and Occupational Toxicology of Cadmium | | 9–13 14–18 (19) | 9–13 14–18 (19) | | | 9–12.30* 14–17.30* (14) | | | |
| Clinical Chemistry Section, Analytical Chemistry Division Committee and Applied Chemistry Division Committee | 18–19* (7) | | | | | | | | |
| Commissions on Automation and V.3 | | | 14–16* (14) | | | | | | |
| Commissions on Quantities and Units, V.4 and I.5 | | | | 14–17* (21) | | | | | |
| Commissions on Toxicology and VI.5 | | | | | | | | | 9–10* (19) |

Subcommittee on
Environmental and
Occupational Toxicology of
Nickel and Commission VI.5

9 – 11*
(18)

Clinical Chemistry Section
Open Meeting

9 – 12.30*
14 – 17.30*
(14)

Physical Chemistry Division

Division Committee

9 – 12.30
14 – 17.30*
(1)

18 – 20*
(14)

9 – 12.30*
14 – 17.30
(1)

Subcommittee on Plasma
Chemistry

9 – 12
14 – 17
(25)

9 – 12
14 – 17
(25)

Commission I.1:
Physicochemical Symbols,
Terminology, and Units

9 – 12
(32)

14 – 17*
(24)

9 – 10*
(17)

9 – 12
(31)

Commission I.2:
Thermodynamics

9 – 12
14 – 15.30*
(24)

9 – 12
14 – 17*
(24)

10 – 12
14 – 16
(24)
17 – 18*
(26)

Subcommittee on Expression
of Uncertainties of
Thermodynamic Data

9 – 12
(22)

| Meeting of | Sunday 2 | Monday 3 | Tuesday 4 | Wednesday 5 | Thursday 6 | Friday 7 | Saturday 8 | Sunday 9 | Monday 10 |
|--|------------------|---|-------------------------------|---|---|-----------------|---------------|-------------|--------------|
| Subcommittee on Thermodynamic Tables | | 14–15.30* (24) | | | | | | | |
| Commission I.3: Electrochemistry | | 9–12 14–17 (5) | 9–12 14–17 (Post Hotel) | 14–17* (13) 17–18* (17) | 9–12 14–17 (1) | | | | |
| Commission I.4: Physicochemical Measurements and Standards | | 9–12 14–17 (20) | 9–12 14–17 (20) | 9–12 14–17 (20) | | | | | |
| Subcommittee on Calibration and Test Materials | | | | | 10–13* (21) 14–17 (23) | | | | |
| Commission I.5: Molecular Structure and Spectroscopy | | 9–13 14–17 17–18* (21) | 9–13 14–17 (21) | 9–13 14–17* (21) | 9–10* 10–13* 14–17 (21) | | | | |
| Commission I.6: Colloid and Surface Chemistry | | 9–12 14–17 (17) 17–18* (21) | 9–12 14–17 (17) | 9–10* 10–13 14–17 17–18* (17) | 9–10* (21) 10–13 14–17 (17) | | | | |
| Division Committee and Chairmen of Commissions | 14–17.30* (1) | | | | 18–20* (14) | 9–12.30* (1) | | | |

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|---|-------------------|---------------|
| Commissions I.1 and I.2 | 14-17* (24) | |
| Commission I.2 and Subcommittee on Thermodynamic Tables | 14-15.30* (24) | |
| Commission I.2 and Subcommittee on Solubility Data | 17-18* (26) | |
| Commissions I.3 and I.6 | 17-18* (17) | |
| Commissions I.3 and V.5 | 14-17* (13) | |
| Commission I.5, Commission on Quantities and Units in Clinical Chemistry and Commission V.4 | 14-17* (21) | |
| Commission I.5 and Subcommittee on Calibration and Test Materials | 10-13* (21) | |
| Commissions I.6 and I.5 | 17-18* (21) | 9-10* (21) |
| Commission I.6 and Chairman only of Commission I.1 | | 9-10* (17) |

| Meeting of | Sunday 2 | Monday 3 | Tuesday 4 | Wednesday 5 | Thursday 6 | Friday 7 | Saturday 8 | Sunday 9 | Monday 10 |
|--|-----------------------------|-----------------------|-----------------------|-----------------------|--------------------------------|---------------------------------|---------------|-------------|--------------|
| Inorganic Chemistry Division | | | | | | | | | |
| Division Committee | 9–12 14–17 (16) | | | | | 9–10* 10–13 14–17 (16) | | | |
| Commission II.1: Atomic Weights | | 9–12 14–17 (6) | 9–12 14–17 (6) | 9–12* 14–17 (1) | 9–12 14–17 (6) | 9–10* (16) | | | |
| Commission II.3: High Temperatures and Refractory Materials | | 9–13 14–17 (13) | 9–13 14–17 (13) | 9–13 (13) | 9–13 (13) | 9–10* (16) | | | |
| Division Open Meeting | | | | | | 9–10* (16) | | | |
| Commissions II.1, II.2, III.1, V.3, IDCNS and Committee on Teaching of Chemistry | | | | 9–12* (1) | | | | | |
| Organic Chemistry Division | | | | | | | | | |
| Division Committee | 9–12.30 14–17.30* (5) | | | | 14–18* (16) | 9–12.30* 14–17.30 (5) | | | |
| Commission III.2: Physical Organic Chemistry | | 9–12 14–17 (16) | 9–12 14–17 (16) | 9–12 14–17 (16) | 9–12 (25) 14–18* (16) | | | | |

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|--|------------------------------|-----------------------------|------------------------|
| Commission III.3: Photochemistry | 9-12 14-17 (Rathaus 1) | 9-12 14-17 (5) | 9-12 14-18* (16) |
| Commission III.4: Medicinal Chemistry | | 9-12.30 14-17.30 (36) | 14-18* (16) |
| Division Committee and Chairmen of Commissions | 14-17.30* (5) | | 9-12.30* (5) |
| Division Open Meeting | | | 14-18* (16) |
| Commissions III.1, V.3, II.1, II.2, IDCNS and Committee on Teaching of Chemistry | | 9-12* (1) | |
| Macromolecular Division | | | |
| Division Committee | 9-12 14-17 (17) | | 10.30-13 (18) |
| Commission IV.1: Macromolecular Nomenclature | 9-12 14-17 (36) | 9-12 14-17 (27) | 9-12 14-17 (27) |
| Commission IV.2: Polymer Characterization and Properties | | 9-12 14-17 (36) | |

| Meeting of | Sunday 2 | Monday 3 | Tuesday 4 | Wednesday 5 | Thursday 6 | Friday 7 | Saturday 8 | Sunday 9 | Monday 10 |
|--|---------------------------------------|---------------------------|--|--------------------------------|--|---------------------------------|---------------|-------------|--------------|
| Analytical Chemistry Division | | | | | | | | | |
| Division Committee | 9–12 14–17 (2) 18–19* (7) | | | | | 9–12* 14–16* 16–18 (2) | | | |
| Commission V.1: Analytical Reactions and Reagents | | | 9–10* (2) 10–13 14–17 (35) | 9–13 (35) | 9–10.30* (16) 10.45–13 (35) | | | | |
| Commission V.2: Microchemical Techniques and Trace Analysis | | | 9–12 14–17 (Rathaus 3) | 9–12 14–17 (Rathaus 3) | 9–10.30* (16) 10.45–13 (20) | | | | |
| Commission V.3: Analytical Nomenclature | | 10.30–13 14–17 (14) | 9–11* 14–16* (14) | 9–12* (1) 14–17 (15) | 9–10.30* (16) 10.45–13* (14) | | | | |
| Commission V.4: Spectrochemical and Other Optical Procedures for Analysis | | 10.30–13 14–17 (15) | 9–12 14–17 (15) | 9–13 (15) 14–17* (21) | 9–10.30* (16) 10.45–13* (14) 14–17 (15) | | | | |
| Commission V.5: Electroanalytical Chemistry | | 10.30–13 14–18 (31) | 9–13 14–17 (31) | 9–12 (31) 14–17* (13) | 9–10.30* (16) 17–19* (26) | | | | |

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|---|---------------|-------------------------|-------------------------------|-------------------------|--|
| Commission V.6: Equilibrium Data | 9–12 (26) | 10–13* 14–17 (26) | 9–12 (26) | 9–12 (26) | 9–10.30* (16) 10.45–13 17–19* (26) |
| Subcommittee on Solubility Data | 14–17 (26) | 10–13* 17–19 (26) | 14–17 (26) | 14–17 17–18* (26) | 9–10.30* (16) 14–17 17–19* (26) |
| Commission V.7: Analytical Radiochemistry and Nuclear Materials | | | 9–11* (14) 13–17 (5) | 9–12 14–17 (14) | 9–10.30* (16) 10.45–13 14–17 (18) |
| Division Committee Secretary and Secretaries of Commissions | | 9–10 (33) | | | |
| Division Committee Chairman and Chairmen of Commissions | | 9–10 (30) | | | |
| Division Committee and Chairmen of Commissions | | | | | 9–12* 14–16* (2) |
| Division Committee, Applied Chemistry Division Committee and Section on Clinical Chemistry | 18–19* (7) | | | | |
| Division Open Meeting | | | | | 9–10.30* (16) |

| Meeting of | Sunday 2 | Monday 3 | Tuesday 4 | Wednesday 5 | Thursday 6 | Friday 7 | Saturday 8 | Sunday 9 | Monday 10 |
|---|-------------|-------------|----------------|----------------|-------------------|-------------|---------------|-------------|--------------|
| Commissions V.1, VI.1, and VI.2 | | | 9–10* (2) | | | | | | |
| Commission V.3, Committee on Teaching of Chemistry, Commissions II.1, II.2, III.1, IDCNS | | | | 9–12* (1) | | | | | |
| Commission V.3 and Commission on Automation in Clinical Chemistry | | | 14–16* (14) | | | | | | |
| Commissions V.3 and V.4 | | | | | 10.45–13* (14) | | | | |
| Commissions V.3 and V.7 | | | 9–11* (14) | | | | | | |
| Commissions V.4, I.5 and Commission on Quantities and Units in Clinical Chemistry | | | | 14–17* (21) | | | | | |
| Commissions V.5 and I.3 | | | | 14–17* (13) | | | | | |
| Commissions V.5, V.6 and Subcommittee on Solubility Data | | | | | 17–19* (26) | | | | |

Commission V.6 and
Subcommittee on
Solubility Data

10–13*
(26)

Subcommittee on Solubility
Data and Commission I.2

17–18*
(26)

Applied Chemistry Division

Division Committee

9–12
14–17*
18–19*
(7)

14–16*
(7)

14–16*
(7)

9–10
10–13*
14–17
(7)

Subcommittee on
New Projects

9–12.30
14–17.30
(35)

9–12
(5)

14–16*
(7)

10–12*
14–16*
(7)

Commission VI.1:
Food Properties

9–10*
(2)

10–13
14–17
17–18*
(1)

9–10*
(2)

10–13
14–17
(1)

9–12
(6)

14–16*
16–17*
(2)

9–13*
(2)

14–16*
(7)

17–18*
(2)

Commission VI.2:
Food Contaminants

9–10*
10–13
14–17
(2)

9–12
14–16*
16–17*
(2)

9–13*
(2)

14–16*
(7)

17–18*
(2)

Coordinating Committee
on Food Chemistry

17–19
(6)

14–16*
(7)

| Meeting of | Sunday 2 | Monday 3 | Tuesday 4 | Wednesday 5 | Thursday 6 | Friday 7 | Saturday 8 | Sunday 9 | Monday 10 |
|--|-------------|--|---|--|--|--------------------------|---------------|-------------|--------------|
| Commission VI.3: Fermentation | | | | 9–13 (23) 14–16* (2) 16–18 (23) | 9–13 (29) 14–16* (7) 16–18 (29) | | | | |
| Commission VI.4: Oils, Fats, and Derivatives | | 9–12.30 14.30–18 (7) | 9–12.30 14.30–18 (7) | 9–12.30 (7) 16–17* (2) | 14–16* (7) | | | | |
| Commission VI.5: Atmospheric Environment | | 9–13 14–17 (27) 17–18* (1) | 9–13 14–17 (27) | 9–11* 11–13 14–18 (18) | 9–10* (19) 14–16* (7) | | | | |
| Commissions VI.6/VI.7: Pesticide Chemistry | | 9–12.30 14–18 (16) | 9–12.30 14–18 (22, 37 & Rathaus 2) | 9–12.30 14–18 (22, 37 & Rathaus 2) | 9–12.30 (36, 37 & Rathaus 2) 14–16* (7) 17–18* (2) | 9–12.30 14–18 (17) | | | |
| Commission VI.8: Water Quality | | | 9–12 14–17 (29) | 9–12 14–17 (29) | 14–16* (7) | | | | |
| Commission VI.9: Reclamation of Solid Wastes | | 9–12 14–17 (28) | 9–12 14–17 (28) | | 14–16* (7) | | | | |

| | | |
|--|-----------------|-----------------|
| Division Committee and Officers of Commissions | 14 – 17* (7) | 10 – 13* (7) |
| Division Committee, Analytical Chemistry Division Committee and Clinical Chemistry Section Committee | 18 – 19* (7) | |
| Division Open Meeting | | 14 – 16* (7) |
| Commissions VI.1 and VI.2 | 9 – 10* (2) | 9 – 13* (2) |
| Commissions VI.1, VI.2 and VI.3 | | 14 – 16* (2) |
| Commissions VI.1, VI.2 and VI.4 | | 16 – 17* (2) |
| Commissions VI.1, VI.2, VI.6/VI.7 | | 17 – 18* (2) |
| Commissions VI.1, VI.2 and V.1 | | 9 – 10* (2) |
| Commissions VI.1 and VI.5 | 17 – 18* (1) | |
| Commission VI.5 and Commission on Toxicology in Clinical Chemistry | | 9 – 10* (19) |

| Meeting of | Sunday 2 | Monday 3 | Tuesday 4 | Wednesday 5 | Thursday 6 | Friday 7 | Saturday 8 | Sunday 9 | Monday 10 |
|---|-------------|--------------------------|--------------|----------------|---------------|-------------|---------------|-------------|--------------|
| Commission VI.5 and Subcommittee on Environmental and Occupational Toxicology of Nickel | | | | 9–11* (18) | | | | | |
| Division Committee and Subcommittee on New Projects | | | | 14–16* (7) | | | | | |
| Subcommittee on New Projects and Committee on Chemistry and Industry | | | | | 10–12* (7) | | | | |
| Stop Press—Addenda | | | | | | | | | |
| Subcommittee on Thermodynamic Tables | | 9–12 15.30–17 (22) | | | | | | | |
| Harmonization of Collaborative Analytical Studies | | 13.30–15 (32) | | | | | | | |

SCIENTIFIC WORK OF DIVISIONS

Reports of Division & Section Presidents to Bureau for the year 1977-78

The following reports of activities since the 29th IUPAC General Assembly [Warsaw, 12-21 August 1977: see *IUPAC Inf. Bull.* (1978), No. 1, pp. 12-25] were presented at the Bureau meeting in Brussels on 1-2 September 1978.

CLINICAL CHEMISTRY SECTION (CCS)

The principal activities of the Section consisted in the work carried out by the four Commissions. In addition, collaboration with International Organizations has continued.

Automation (CACC)

The document 'Characteristics and Attributes of Instruments Intended for Automated Analysis in Clinical Chemistry' has been finalized, edited and sent for publication (included in this issue, pp. 233-240). The Commission is taking part in a joint task with Commission V.3 to prepare a document entitled 'Nomenclature on Automated Analysis'.

Quantities and Units (CQUCC)*

(i) The Commission met in Giessen (FRG) from 10 to 12 April 1978.

(ii) The two documents 'Quantities and Units in Clinical Chemistry: Recommendation 1977' and 'List of Quantities in Clinical Chemistry: Recommendation 1977' have been approved both by the IUPAC Council and the International Federation of Clinical Chemistry. They are in the process of being published.

(iii) Another document, 'Quantities and Units in Clinical Chemistry: Optical Spectroscopy' consists of three parts. Part 1 has been discussed with Commissions I.5 and V.4 and submitted to IDCNS in view of its publication (included in this issue, pp. 241-260). Part 2 is being prepared in collaboration with Commissions I.5 and V.4. A first draft of part 3 has been extensively discussed in the Commission; a second draft is being prepared for submission to other IUPAC Commissions.

(iv) Three other documents representing subheadings of the general title 'Quantities and Units in Clinical Chemistry' are under discussion: (a) change in properties as a function of time; (b) tentative

definitions of fundamental terms; (c) systematic names for intensive derivatives of extensive quantities.

Toxicology (CToCC)*

(i) The Commission met for two days in May 1978 in Kristiansand (Norway). Simultaneously, the Subcommittee on Environmental and Occupational Toxicology of Nickel had organized the Kristiansand Conference on Nickel Toxicology (22-24 May 1978), which proved to be a great success. Thirty papers were presented on methods of nickel analysis, monitoring of industrial exposures to nickel, and studies on nickel metabolism and toxicology. The subcommittee is preparing a monograph on nickel analysis and toxicology for publication in *Pure Appl. Chem.*

(ii) The Commission has further been active in convening a first meeting on the environmental and occupational toxicology of cadmium (Kristiansand, 25-26 May 1978) in which eleven contributions were presented and an interlaboratory quality control programme was set up.

Teaching (CTeCC)

(i) The Commission is preparing a prototype curriculum for a two year postgraduate training programme leading to a Masters Degree in Clinical Chemistry.

(ii) Members of the Commission have participated in courses in clinical chemistry organized by WHO in developing countries (Indonesia, Ghana, Ivory Coast) and helped in the organization by IUB of a biochemistry course in Pakistan.

Other Activities of Section

(i) There is a continuing collaboration of the Section and its Commissions with other international bodies, especially the International Federation of Clinical Chemistry (IFCC) and the World Health Organization (WHO). WHO has recently published a booklet entitled *The SI for the Health Professions*, the manuscript of which had been reviewed and discussed by members of the Section with the author, Dr. LOWE of WHO. The fact that WHO is now recommending to the whole medical profession a system of units elaborated with the active participation of IUPAC can be regarded as a most useful contribution of IUPAC towards better health care.

(ii) A Symposium on the Harmonization of Collaborative Analytical Studies took place in London, 9-10 March 1978 [see *IUPAC Inf. Bull.*

*Synopsis minutes of the meeting of the Commission in 1978 have been published elsewhere in this issue under 'Reports of IUPAC Bodies'.

(1978), No. 2, pp. 132–137]. It was organized by the Analytical Chemistry and Applied Chemistry Divisions and the Section on Clinical Chemistry of IUPAC, with the participation of Prof. LOUS, Past President and Dr. ROTH, President of the Section.

M. ROTH
President

28 July 1978

I. PHYSICAL CHEMISTRY DIVISION

Reports of the Commissions and subcommittees within Physical Chemistry Division are presented hereunder.

Subcommittee on Plasma Chemistry. An informal meeting of the subcommittee was held on 23 August 1978 at Andover (NH, USA) during the Gordon Conference on Plasma Chemistry. Preparations for a triple event in Zürich during the week 27 August–1 September 1979 are well under way. The events are: (i) 4th International Symposium on Plasma Chemistry, (ii) Round Table on Thermal Plasma Processing, and (iii) the Topical meeting on the Interactions of Low Pressure Plasmas with Solid Surfaces.

‘Bibliography on Plasma Chemistry’ has recently been completed in manuscript form. It has 7000 references dated from 1856 up to 1973. ‘Spectroscopic Methods of Temperature Measurement’ is under publication by University of Limoges and will appear at the end of 1978.

A Task Group of ‘Transport Phenomena’ has been set up to study, as a first step, selected properties of pure gases under atmospheric conditions.

Physicochemical Symbols, Terminology and Units (I.1)

The Commission has not met, but members have examined and commented on a number of IUPAC and ISO documents. Corrections and minor changes to *Manual of Symbols and Terminology for Physicochemical Quantities and Units* have been collected in preparation for publishing a revised edition in the near future. The chairman represented the Commission (and IUPAC) at the meeting of the Consultative Committee on Units at Sevres in May 1978. A subcommittee, of which the chairman is Prof. K. LAIDLER, has been appointed to examine problems of symbols, nomenclature, and units in chemical kinetics; it will meet in September 1978.

Thermodynamics (I.2)

The monograph ‘Combustion Calorimetry’ edited by S. SUNNER and M. MÅNSSON, Volume 1 of a series *Experimental Chemical Thermodynamics* being published under the auspices of the Commission, will be in print in October of this year. The Task Group dealing with the second volume, ‘Thermodynamic and Transport Properties of Salts with Organic Anion or Cation’, which is to be edited by P. FRANZOSINI met at Lysekil, Sweden in June 1978. The list of contents has reached a final stage and it is hoped that a major part of the manuscript will be ready by the end of the year.

Subcommittee on Thermodynamic Tables. Director of the Thermodynamic Tables Project Centre, Dr. S. ANGUS, has prepared a second draft of ‘*Guide to the Correlation of Experimental Thermodynamic Data on Fluids*’ and sent it for comment to 80 scientists. The volume of thermodynamic tables for methane was published in June 1978, and that for nitrogen is in press. The text for a monograph on propene is being finalized. Tables for ammonia have been received from laboratories in USA and USSR. Liaison is being maintained with the International Association on the Properties of Steam.

Prof. J. KESTIN is developing methods for correlating the transport properties (viscosity, thermal conductivity, diffusivity) of simple gases at low pressures. It is hoped that the final outcome will be a correlation encompassing not only transport properties, but also the second virial coefficient and mixtures in addition to pure gas properties.

Subcommittee on Expression of Uncertainties of Experimental Thermodynamic Data. This subcommittee, constituted in Warsaw, will meet in November 1978 in London and will include in its agenda an item, if and how its work should be coordinated with the related work recently started by the Bureau International des Poids et Mesures.

Electrochemistry(I.3)*

Two reports, one on ‘Electrode Reaction Orders, Transfer Coefficients and Rate Constants’, the other have been issued as PNAs and are undergoing their final revision. A report recommending criteria for the selection of reference redox systems in non-aqueous solutions is being prepared. Invitations to contributors to a ‘Critical Compilation of Electrode Potentials’ have been sent out and it is hoped to complete the assignment of the chapters in this volume in the next few months. The planning of this major effort was the subject of a meeting of representatives of this Commission and of V.5 in Paris in June 1978 (R. PARSONS and J. JORDAN). The first draft of a report on nomenclature in the field of ‘Adsorption at Electrified Interphases’ has been prepared and circulated to members of the Commission for criticism and discussion. Data collection in the fields of conductance in dilute solution and of kinetics of electrode reactions continues.

Physicochemical Measurements and Standards (I.4)

Work planned in Warsaw on the initiation of recommendations for methods of physicochemical measurement is proceeding. Of the recommendations for reference materials, those for ‘pressure–volume–temperature relationships’ have appeared in *Pure Appl. Chem.*, and those for ‘reflectance’, ‘potentiometric ion activity’ and ‘testing of distillation columns’ are in process of publication. The Subcommittee on Calibration and Test Materials, reconstituted in Warsaw to deal with one subject—temperature—met jointly in Paris in May 1978 (for synopsis minutes, see pp. 195–196) with Working Group II of the Consultative Committee on

* Report of this Commission was received after the Bureau meeting.

Thermometry of the Conference International des Poids et Mesures to discuss the need for and use of reference materials for temperature measurement. Working Group II is responsible for revision of the secondary reference points of the International Practical Temperature Scale, and as a result of this meeting have acknowledged the IUPAC interest in temperature measurement. Plans were made for future cooperation.

Molecular Structure and Spectroscopy (I.5)*

The following final (definitive) recommendations on nomenclature and symbols, approved by Council at Warsaw in 1978, have now been published: (i) Recommendations for Symbolism and Nomenclature for Mass Spectroscopy [*Pure Appl. Chem.*, **50**, No. 1 (1978), pp. 65–73]; (ii) Recommendations for Presentation of Infrared Absorption Spectra in Data Collections—A. Condensed Phases [*Pure Appl. Chem.*, **50**, No. 3 (1978), pp. 231–236] and the following further report will be published shortly; (iii) Definition and Symbolism of Molecular Force Constants (in *Pure Appl. Chem.*), and (iv) Recommendations for Presentation of Raman Spectra in Data Collections has just been published in provisional form in *IUPAC Inf. Bull.* (1978), No. 2, pp. 145–150.

A task force from Commissions I.5, V.4 and CQUCC has met and reached agreement on most of the points of dispute in CQUCC's forthcoming document on spectroscopy and the remaining referred to IDCNS.

The dissemination of Recommendations has continued to be a matter of concern to the Commission. Whereas NMR Recommendations (approved 1975) have been reprinted in the informal *NMR Newsletter* and in *Organic Magnetic Resonance* attempts to reprint the Recommendations on Mass Spectroscopy (approved 1977) in international specialist journals have thus far been unsuccessful, but efforts are continuing.

Subcommittee on Infrared and Raman Spectroscopy. An informal meeting of the Commission and the subcommittee was held in Bangalore (India) at which particular attention was given to further developments in Raman spectroscopy, which will require extensions of the Provisional Recommendations approved in Warsaw. Reports of 'round-robin' studies of samples in Japan (detailed report by T. SHIMANOUCHI) and USA (progress report by B. BULKIN) indicate that guidance is needed on the control of instrumental factors in order to avoid extremely serious errors in reports of Raman intensities and dipolarization ratios. Further experimental studies in USA and Europe are underway, the results of which should provide a basis for IUPAC Recommendations.

Subcommittee on Chiroptical Phenomena. Despite the untimely death of Prof. W. KLYNE, Chairman, the subcommittee has continued its efforts to arrive at a consensus in order to present a document in Davos. Prof. G. SNATZKE is now Chairman of this subcommittee.

Colloid and Surface Chemistry (I.6)

Substantial comments have been received from the Editor of *Pure Appl. Chem.* and the IDCNS on the text agreed in Warsaw of 'Selected Definitions, Terminology and Symbols for Rheological Properties', and this will require a further draft. 'Nomenclature for Zeolites' and 'Reporting Experimental Data dealing with Critical Micellization Concentrations' have been approved by IDCNS, and camera-ready copy of the two documents is being prepared, but there are disagreements with the Editor regarding the second one. Revised drafts of 'Reporting Guide on Trough Experiments' and 'Nomenclature of Light Scattering' have been prepared together with a first draft of a nomenclature paper on the chemical physics of surfaces.

The *ad hoc* subcommittee on correlation of catalyst activity set up after the Madrid meeting (1975) at the request of the International Company Associates Group presented its report in Warsaw and, having completed its task, was discharged. The result of this speedy action is that no record of the existence of the subcommittee and its membership appears in the *Comptes Rendus* of the Union. As a result of the report by this subcommittee a Newsletter is being issued by the Commission Secretary to keep groups working in the field aware of each other's activities. A Colloid Newsletter is also planned.

D. AMBROSE

10 August 1978

Secretary (for President)

II. INORGANIC CHEMISTRY DIVISION

The Division has carried on its programme of work through its three Commissions as follows:

Atomic Weights (II.1)

The Commission has been active by correspondence in carrying out actions defined in Warsaw and in preparing for the interim meeting of the Subcommittee on Assessment of Isotopic Composition (SAIC) in Hamilton (August 1978). These include: (i) A proposal for the modification of footnotes to the Table of Atomic Weights has been prepared by S. PEISER. (ii) A revised copy of the technical policy notes has also been prepared by S. PEISER. (iii) Revised tables of isotope abundances including changes adopted in Warsaw have been prepared. (iv) A translation into French of the 1975 and 1977 reports has been undertaken. (v) Chemical determination of atomic weights of the following elements are under review: Ni, Zn, Ge, Se, Sm, Ti, Mo, Te, N. (vi) Data on all elements have been assigned for review to SAIC members previous to the Hamilton meeting—by 1 July data were starting to come in. (vii) The 1977 Report on Atomic Weights of the Elements, including modifications adopted and revised tables has been finalized for publication in *Pure Appl. Chem.*

Nomenclature of Inorganic Chemistry (II.2)

At its meeting in Warsaw 1977 the Commission recognized that its main task for the future was the

* Report of this Commission was received after the Bureau meeting.

revision of *The Nomenclature of Inorganic Chemistry*, 2nd edition, 1970 (The Red Book). A working party (convenor, G. J. LEIGH) was set up to gather the opinions of editors and other users concerning its limitations and what may be done to improve its usefulness. Some 60 editors of inorganic chemical journals on a worldwide basis have been contacted and their helpful comments are undergoing collation.

Documents on 'Nomenclature of Elements of Atomic Numbers greater than 100' and on 'Nomenclature of Isotopically Modified Compounds' will be ready for submission for publication in definitive and provisional forms respectively, after a final review at the next meeting of the commission in Oxford on 11–16 September 1978 (for synopsis minutes, see p. 196). A document presenting provisional proposals for 'Nomenclature of Hydrides of Nitrogen and Derived Cations, Anions, and Ligands' is in press for publication in *IUPAC Inf. Bull.* (1978), No. 2, pp. 151–160.

Other areas in which the Commission's working parties (convenors in parenthesis) are very actively engaged and have reached an advanced stage are as follows:

- Nomenclature of Cluster Compounds including Boranes and their Derivatives (D. M. P. MINGOS, and W. H. POWELL with special reference to Boron).
- Three Dimensional Heteropolyacids Nomenclature (Y. JEANNIN)
- Stereochemical Nomenclature of Coordination Complexes (W. H. POWELL)

Other matters under consideration but less advanced are:

- Applications of Additive Nomenclature to Non-metallic Compounds (Y. JEANNIN)
- Ring and Chain Nomenclature (K. C. H. BUSCHBECK)
- Nomenclature of Inorganic Polymers (W. H. POWELL)

A working party has also been established to review the development of Section G (Nomenclature of Organic Chemistry) with reference to its impact on inorganic chemical nomenclature.

To increase the diversity of its international membership and to provide a pool of experts from which to draw its future Titular Members, the Commission sought to increase its minimum number of Associate Members from 8 to 12, which was approved. The following people who were invited to fill the vacancies as Associate Members have accepted: D. H. BUSH (USA), T. D. COYLE (USA), J. KLIKORKA (Czechoslovakia), T. REEDIJK (The Netherlands), E. SAMUEL (France). K. YAMASAKI has retired from the associate membership, having completed his term of office. New National Representatives are: H.-H. EMONS (GDR), A. RAMAO DIAS (Portugal), M. ZIGMUND (Czechoslovakia).

The Commission shall welcome as observers at the 1978 meeting in Oxford: E. W. GODLY (UK), M. GREEN (UK), W. W. LINDELL (Wates Bursar, UK), T. C. SLOAN (USA), and K. YAMASAKI (Japan). J. REEDIJK has been appointed Inorganic Division representative on the Commission on Physical Organic Chemistry

High Temperatures and Refractory Materials (II.3)

This Commission met after an international conference in Dubrovnik, Yugoslavia on 29–30 June and 1 July

1978 (for synopsis minutes, see p. 197). The following are its main activities:

(i) The international collaborative study of standard electrodes for high temperature solid oxide electrolyte systems will begin this year with the distribution of materials to 12 laboratories throughout the world. These will measure the electromotive forces of some designated cells and a report of the results will be submitted in Davos (1979).

(ii) The collaborative study on the melting point of yttrium oxide has been completed and published in French in *J. High Temp. High Pressure* and the edited version of this will be submitted, in the English translation, for publication in *Pure Appl. Chem.* in autumn 1978. A recommended value of the melting point for this material has been arrived at. This value is $2439 \pm 12^\circ\text{C}$.

(iii) A review of the melting points of the lanthanide metal oxides has also been completed and this will be submitted for publication in the same Journal before the Davos meeting. A critical evaluation of the chemical properties of the 12 metals which were selected as standard materials for vaporization pressures and scanning calorimetry measurements is now complete and will be submitted for publication in the Journal this autumn.

(iv) An international collaborative study group has now been formed and this will carry out a literature survey of the critical properties of alkali metals. The results are to be reported at the Davos meeting.

(v) The work of the international committee on carbon characterization is in the process of being written up, eventually to be published as a manual. Sections of this manual will be submitted for publication seriatim in the Journal.

Sponsorship of Symposia

The Division has been active in sponsoring several symposia during 1978:

- 6th International Conference on Non-aqueous Solutions (Waterloo, Canada): 7–11 August 1978
- 8th International Conference on Applications of the Mössbauer Effect (Kyoto, Japan): 28 August–1 September 1978
- 19th International Conference on Coordination Chemistry (Prague, Czechoslovakia): 4–8 September 1978
- 4th International Conference on Solute–Solute–Solvent Interactions (Vienna, Austria): 11–15 September 1978

Sponsorship has also been approved for the following meetings in 1979:

- 6th International Conference on Solid Compounds of Transition Elements (Stuttgart, FRG): 12–16 June 1979
- 4th International Meeting on Boron Chemistry (Salt Lake City, Utah, USA): July 1979
- International Conference on Phosphorus Chemistry (Halle, GDR): 17–21 September 1979
- 9th International Conference on Organometallic Chemistry (Dijon, France): 3–7 September 1979

N. N. GREENWOOD
President

7 August 1978

III. ORGANIC CHEMISTRY DIVISION

The Organic Chemistry Division Committee has traditionally viewed its responsibility as tripartite: (i) organization of general and specialized symposia in organic chemistry, (ii) coordination and support of the work of the Commissions of the Organic Chemistry Division, and (iii) cooperation with and assistance to other bodies of IUPAC. The present Committee has been well content to follow the tradition of its distinguished forebears.

Sponsorship of Symposia

Firm commitments have been obtained for the organization of the following symposia in 1980 that were approved as tentative applications at the Warsaw General Assembly:

- XII International Symposium on Natural Products, Tenerife, Canary Islands (Prof. A. G. GONZÁLES).
- V IUPAC Conference on Physical Organic Chemistry, Santa Cruz, USA (Prof. J. F. BUNNETT).
- III International Conference on Organic Synthesis, Madison, USA (Prof. B. M. TROST).
- IV International Symposium on Novel Aromatic Compounds (ISNA), Jerusalem, Israel (Prof. I. AGRANAT).

The last was previously tentatively approved for 1981, but IUPAC sponsorship has now been recommended for 1980, provided there is no conflict with other related symposia sponsored by the Division. In this connection I regret to report that a conflict of dates has arisen in 1978 between the Symposium on Marine Natural Products and the Conference on Organic Synthesis. Sponsorship of the former was originally recommended by the Division for 7–10 September and of the latter for 11–15 September, since there was no overlap of dates. However, the organizers of the former have unilaterally changed its dates to 12–15 September. Every effort is being made to avoid such conflicts in future.

IUPAC sponsorship of the following additional symposia has been recommended subsequent to the Warsaw meeting:

- 25 September–2 October 1978: International Symposium on Frontiers in Bioorganic Chemistry and Molecular Biology, Tashkent and Moscow, USSR (Prof. YU. A. OVCHINNIKOV).
- 2–5 September 1979: International Symposium on Aromaticity, Dubrovnik, Yugoslavia (Dr. A. GRAOVAC).
- 3–7 September 1979: IX International Conference on Organometallic Chemistry, Dijon, France (Prof. J. TIROUFLET).
- 3–7 December 1979: International Symposium on Hydrocarbon Chemistry, Los Angeles, USA (Prof. G. A. OLAH).

At the Warsaw meeting of the Division Committee it was agreed that the Division should take the initiative in fostering the organization of symposia in new fields of current intensive activity and interest. Four such fields were considered to be appropriate in this respect and I now report on the progress made in each of these: (i) Organometallic Chemistry Applied to Organic Synthesis: Prof. J. K. STILLE has undertaken

to organize a symposium in this area at Colorado State University, in 1981; (ii) Organic Electrochemistry: Prof. L. EBERSON (Lund) has been consulted about this and advises that it would be better to include a section on this topic in a general symposium on organic synthesis rather than organize a separate symposium; (iii) Biomimetic Reactions Applied to Organic Synthesis: Prof. R. BRESLOW (Colombia) has agreed to undertake the organization of a symposium on this topic, probably in 1981; (iv) Mammalian Scents and Pheromones: consultations concerning this have been initiated and will be pursued.

Nomenclature of Organic Chemistry (III. 1)*

Reprinting of Sections A, B, C, D, E, F and H. A text has been prepared for the reprinting of the rules for the nomenclature of organic chemistry in a single book. Sections A, B, C, D; E, F and H comprise the following: A. hydrocarbons, B. heterocycles, C. compounds with characteristic groups, D. organic compounds containing not exclusively C, H, N, O, Halogen, S, Se and/or Te, E. stereochemistry, F. natural products, and H. isotopically modified compounds.

Hantzsch–Widman Nomenclature. A document, Revision of the Extended Hantzsch–Widman System of Nomenclature for Heteromonocycles, has been prepared for publication as provisional recommendations.

Stereochemistry. Work on the extension of the stereochemical rules is progressing. Experts have been queried to find areas needing attention and their responses are being evaluated.

Section G: Systematic Substitutive Nomenclature. Work on a completely systematic nomenclature is under way. Preliminary documents have been circulated and comments received are being studied.

Nodal Nomenclature. A document will be submitted for publication in *Angew. Chem.* to obtain the reaction of the chemical community to this new nomenclature proposal.

Membership Changes. On 13 November 1977 Prof. W. KLYNE died. The Commission was greatly saddened to hear of the death of a good friend and a valued, productive colleague. Prof. N. LOZACH was appointed as a Titular Member to fill the vacancy.

Physical Organic Chemistry (III. 2)*

The Commission continued to carry out further work on the three projects started in 1974–75.

(i) *A Glossary of Terms used in Physical Organic Chemistry.* A revised version of the glossary was made on the basis of comments received. In early Summer 1978 it looked as if the Commission might be able to submit the glossary to IUPAC for acceptance and publication after its meeting in September 1978 (for synopsis minutes, see p. 198). Unfortunately, however, there are doubts at present about the realization of this schedule, due to the sad and lengthy

*Synopsis minutes of the meeting of the Commission in 1978 have been published elsewhere in this issue under 'Reports of IUPAC Bodies'.

illness of Prof. V. GOLD who is in charge of the working group for the glossary.

(ii) *Systematic Nomenclature of Organic Reactions*. The Commission decided in 1976 to split the work into two parts, namely, so-called simple reactions (i.e., substitutions, eliminations, additions) and complex reactions (e.g., cyclizations, rearrangements, etc.). The working group on simple reactions, headed by Prof. J. F. BUNNETT, is in the process of discussing a first draft of a manuscript that demonstrates that a systematic nomenclature is not only possible, but can be designed in such a way that every organic chemist can use it without specialized training.

(iii) *Classification of Organic Reaction Mechanisms*. Complex reactions as well as reaction mechanisms still offer many difficulties in logical classification. They are being discussed in three working groups consisting of members of the Commission and chemists from various countries who have volunteered to cooperate with the Commission.

Other Matters. The Commission took great advantage of the presence of Wates Bursary Fellows (UK) at its meeting in Montpellier (1976) and of Wates as well as National Science Foundation Fellows (USA) at the Warsaw meeting (1977). These Fellows cooperated in a very constructive way not only at the meetings but also agreed to work by correspondence with the Commission after the meetings. Their interest in the work of the Commission demonstrates also that the Commission's projects are indeed welcomed by the general community of organic chemists.

Due to the election of Prof. H. ZOLLINGER as Vice-President of IUPAC he has resigned from the Chairmanship of the Commission and Prof. J. F. BUNNETT became the new Chairman after 1 May 1978.

Photochemistry (III. 3)

Five Titular and five Associate Members met during the VII IUPAC Symposium on Photochemistry (Leuven: 24–28 July 1978) and a regular meeting was held in Leuven after this Symposium, on 29 July 1978. Status of the Commission's projects is presented hereunder.

(i) *Terms and Symbols in Photochemical Literature*. A first list of definitions has been put together and the first draft of the glossary is presently being prepared to provide a starting point for discussion by the Commission.

(ii) *Guidelines for Recording Experimental Data in Photochemistry*. An outline of the topics has been put together, and preliminary conclusions in each of the various areas are being put together presently.

(iii) *Educational Aspects in Photochemistry*. A number of inquiries has already been carried out, and further collection of information is in progress.

(iv) *Coordination of Symposia and International Photochemical Societies*. The Commission has assisted in the organization of the VII IUPAC Symposium on Photochemistry, July 1978, in every way required. Contacts with the European, the Inter-American, and the Japanese Associations are permanently and routinely made. Furthermore, a routine contact with the International Committee for the Science of Photography has been established.

(v) *Other Work*. The Commission has reviewed the Third Draft of the Glossary of Terms prepared by Commission III. 2 (Prof. V. GOLD, London) and has suggested a number of changes and additions.

Medicinal Chemistry (III. 4)

Teaching of Medicinal Chemistry. Liaison has been maintained on this topic between our Dutch colleagues (Profs. REKKER and NAUTA) and representatives of UNESCO (Mr. ENEBERG) and WHO. Details of these discussions and proposals for further action will be announced at the meeting of the Commission at the University of Sussex on 3 September 1978.

IUPAC sponsored meetings. A successful Symposium on the Relationship of Biological Activity and Chemical Structure, sponsored jointly by IUPAC and IUPHAR and organized by the Medicinal Chemistry Division of the Royal Netherlands Chemical Society, was held at Noordwijkerhout during 30 August–2 September 1977.

Proposed Division of Health & Environmental Chemistry. Enquiry continues into the possibility of creating this Division within IUPAC and to that end Dr. CAVALLA has met with Dr. EGAN (Past President of the Applied Chemistry Division) a number of times to discuss the topic.

Other Activities. (i) Dr. CAVALLA represented IUPAC at the XI Cioms Round Table Conference on Trends and Prospects in Drug Research & Development (Geneva: 8–9 December 1977). (ii) Prof. NAUTA has accepted a liaison role with this WHO group on Special Programme for Research & Training in Tropical Diseases and will attend a meeting in Geneva in July 1978.

Other Activities

The Division has expressed its interest and willingness to participate in the IUPAC–SCOR Liaison and in the work of the IUPAC Committee on SCOPE. It has also tendered comments on the Draft Report of the Subcommittee on New Projects of the Applied Chemistry Division and on the Executive Secretary's memorandum on Reconsideration of Policy for all IUPAC Bodies to Meet at General Assembly.

4 August 1978

P. YATES
President

IV. MACROMOLECULAR DIVISION

General. The activities of the Division were traditionally centered around the following topics: (i) sponsorship of symposia and microsymposia, (ii) the work of Commission on Macromolecular Nomenclature, and (iii) activities of Commission on Polymer Characterization and Properties and its Working Parties. The concept of Working Parties has proved to be useful and has to be developed as much as possible. Other new forms of activities such as periodical publications, educational programmes etc. seem to be quite important parts of the Division.

Division Rules. Macromolecular Division Rules approved by the Division Committee in Warsaw on 12

August 1977 were circulated again to the Division Committee and after incorporating some suggestions made by the Members and by the IUPAC Executive Secretary. The final document will be seen by the committee again at the next meeting (London: 29 August 1978) and then presented to the Bureau when it meets in Brussels on 1 September 1978.

Education in Polymer Science. It was decided at the Division Committee meeting in Paris (3 July 1976) and confirmed at the last meeting in Warsaw (August 1977) that the Division considers the problem of education and training in polymer science at universities as a very important one. Prof. SHELDON's report on education in polymer science will be discussed again at the Division Meeting in London on 29 August after its revision by Dr. BARRETT, Dr. ENGEL and Prof. ALLEN will compose a statement which might initiate a study on how material in both the chemistry and physics of macromolecules can be introduced into normal discipline-oriented courses in both chemistry and physics. At the present time only in the universities in USSR polymer science is introduced in general courses for all students of chemistry.

Sponsorship of Symposia and Microsymposia

1978 (i) The final programme and 3rd circular of 25th International Symposium on Macromolecules to be held in Tashkent (USSR), 17–21 October have already been printed. (ii) International Symposium on Polymer Dispersions, Dresden (GDR) will be held on 4–6 September.

1979 Preparations are in progress for: (i) 26th International Symposium on Macromolecules, Mainz (FRG), 17–21 September; (ii) 19th Microsymposium: Recent Aspects of Mechanisms of Degradation and Stabilization of Hydrocarbon Polymers, Prague, 9–12 July; (iii) 20th Microsymposium: Microcalorimetry of Macromolecules, Prague, 16–29 July; and (iv) 5th Conference on Modified Polymers, Bratislava, 2–5 July. In 1979 we will also have a section in the framework of 27th IUPAC Congress (Helsinki: 27–31 August) devoted to the chemistry and technology of natural polymers.

1980 IUPAC International Symposium on Macromolecules dedicated to the 25th anniversary of isotactic polypropylene was already discussed and approved by the Division Committee. This Symposium is to be held in Firenze on 7–13 September. The draft scientific programme has already been prepared by the Organizing Committee and will be discussed at the next Division Committee Meeting (London: 29 August 1978).

In addition to these we still have some official proposals for the Symposia which, according to the preliminary information, are likely to be of a standard commensurate with the granting of the sponsorship of the Union.

1979 Symposium on Polymeric Amines and Ammonium Salts, Ghent (Belgium), 24–26 September.

1980 (i) New Frontiers in Polymer Chemistry and Polymer Applications, Madras (India), 7–11 January. (ii) 3rd International Symposium on

Polyvinyl Chloride, Cleveland, Ohio, USA, June. (iii) 21st Microsymposium on Ringopening Polymerization of Heterocycles, Karlovy Vary (Czechoslovakia), 15–20 September. (iv) 7th Discussion Conference on Polymer Networks, Karlovy Vary (Czechoslovakia), 22–27 September.

These symposia were discussed at the Division Committee Meeting on 29 August (for synopsis minutes, see p. 199). The Committee approved the symposium in Ghent (September 1979), and supported Karlovy Vary Symposia in Carlsbad (15–20 September and 22–27 September 1980). The Committee also supported Madras Symposium 'New Frontiers in Polymer Chemistry and Polymer Applications' (7–11 January 1980) but suggested to the National Organizing Committee to have wider national representation.

Symposia held in 1977–1978. 26th IUPAC Congress had been held in Tokyo, 4–10 September 1977. During the 4 simultaneous sessions on Macromolecular Chemistry about 250 papers were presented. A post-congress Symposium on Biomedical Materials was held in Kyoto, followed by a Polymer Colloquium organized by the Society of Polymer Science, Japan (13–15 September).

18th Prague Microsymposium on Synthetic and Semisynthetic Polymer Catalysts and Affinants was held on 10–13 July 1978. Past-President of the Macromolecular Division, Prof. OVERBERGER, was an official representative of IUPAC at the above meeting. Four days later also in Prague was held 6th Discussion Conference: Chromatography of Polymers and Polymers in Chromatography (17–21 July 1978).

Macromolecular Nomenclature (IV.1)

The Commission had prepared a final draft of the document on stereochemical definitions, which was approved. The next meeting of the Commission is to be held 12–15 October 1978 in Moscow, USSR. All arrangements for this meeting were done in close collaboration with IUPAC Secretariat and USSR Academy of Sciences.

Polymer Characterization and Properties (IV.2)

Three of the four Working Parties in the Commission: Structure and Properties of Commercial Polymers (WP I); Molecular Characterization of Commercial Polymers (WP II); and Supported Polymer Films (WP III) have remained active and three papers reporting collaborative work are in the process of publication in *PAC* possibly in 1978. Two reports arise from WP I: (i) 'The Effect of Molecular Orientation on the Mechanical Properties of Rubber Modified Polystyrene' by W. RETTING; (ii) 'Mechanical Properties of Rigid PVC – Effect of Fillers' by J. C. CHAUFFOUREAUX; and one from WP II 'Molecular Characterization of Polyethylene' by W. BALL and TH. G. SCHOLTE. All three reports arise from collaborative programmes in many industrial and university laboratories and hopefully will prove of value to polymer scientists and engineers.

Several new programmes in WP I have been initiated including extension of work on orientation in polypropylene films, a study of the inclusion of PVC morphology on its rheology, and a study of low density polyethylene in the tubular film process.

Two preliminary papers from WP III have been published: (i) Analysis of Functional Gauges in Amino Resins – a Literature Survey by G. CHRISTENSEN in

Progr. Org. Coatings; and (ii) A Survey on Work on Adhesion by U. ZORLL in *J. Color Chem. Assoc.*

The Division Committee still has no information about the activities of the Working Party on Thermodynamic Properties of Polymers. Prof. OVERBERGER and Dr. DE VRIES have written to the Chairman, Dr. WILSKY, and never got any reply. The situation with this Working Party will be discussed at the Division Committee Meeting in London on 29 August 1978 and hopefully it would be decided to ask Dr. WILSKY to resign if he has not the time to carry out his commitments in connection with the Working Party. Taking into account the importance of the topic the Committee will try to find another candidate to chair this Working Party.

The Commission met in London on 30 August 1978 (for synopsis minutes, see p. 200) and decided to commence limited collaborative work for three new Working Parties. These will cover:

- Thermal Properties of Polymers
- Surface Properties of Polymer Films and Fibres, and
- Kinetic Parameters for Radical Polymerization.

2 August 1978

Addendum in small print
submitted 1 September 1978

V. A. KABANOV
President

V. ANALYTICAL CHEMISTRY DIVISION

The seven Commissions of the Division, the Division Committee, its task force on future activities and orientation of the Division, and the Division Committee Executive have all been active since the 29th General Assembly in Warsaw, August 1977.

Division Committee

At its meeting on 10–11 July 1978 at Knoxville, Tennessee, the Division Executive deliberated on some of the implications of the Executive Committee's rejection of a number of the rules which the Division has been operating for many years, *vis à vis* matters of geographical representation and the manner of election of the Division Secretary. A condensed version of the rules will be re-submitted for approval shortly. Points relating to the forthcoming election were discussed and a course of action for future activities of the Commissions was formulated for consideration by the Division Committee before the Assembly at Davos. Problems arising from the proliferation of broad spectrum conferences on analytical chemistry were reviewed and initial plans were made to set up a multilingual analytical dictionary to back up the recently produced *Compendium of Analytical Nomenclature* which is now being updated, revised and re-arranged by a Subcommittee of the Division Committee as a 5–6 year project.

Much time was spent reviewing submissions by Committee members, Commission chairmen and secretaries on the implication of the Minimum Assembly Schedule proposed by the Executive Secretary. This idea is not favoured by the Division which regards the General Assembly, with participation by all the Commissions of IUPAC, as the prime moving force in

IUPAC's progress. Suggestions were made to reduce the frequency of General Assemblies, cut the number of Titular Members, and temporarily trim down some of the peripheral activities of the Union which are not vital to its central purpose. It is felt that the Union should revert to its format of 10–15 years ago.

The Division Committee participated in the joint meeting of Divisions V, VI and the Clinical Chemistry Section with representative international bodies on the Harmonization of Collaborative Analytical Studies at The Royal Society in London (March 1978), being represented by its President, who opened the Symposium on behalf of the President of the Union, and by Prof. FREISER. [An account of the Symposium has been included in *IUPAC Inf. Bull.* (1978), No. 2, pp. 132–137.] Follow-up action is to be discussed with the Presidents of the other two IUPAC bodies at the meeting of Division Presidents in Brussels in August/September 1978.

Contacts with ISO have been maintained by refereeing ISO documents sent to the Secretariat, but the Division is concerned to point out that this does not constitute 'approval' in the usual sense of the word as used by IUPAC. Feed-back from ISO is virtually non-existent and it is uncertain if ISO pays any heed to IUPAC comments. Work of the Commissions during the period September 1977–August 1978 is presented below.

Analytical Reactions and Reagents (V.1)

A Commission meeting is planned at the FECS Euro-analysis Conference in Dublin, 26 August 1978 (for synopsis minutes, see p. 202). The Commission's work on behalf of the Union for the CEE on analytical methods/food additives was terminated in 1977. The Commission needs advice from the Executive Committee of IUPAC on whether or not it should be prepared to engage in a similar task in the near future.

Projects on the determination of steroids, aldehydes and ketones, amines and a report on redox indicators have now been completed and written up for publication. Projects in progress relate to: polyphenols; traces of Pb, Cu, Cd in organic compounds used as food additives; organotin compounds related to food packaging; acid–base indicators in nonaqueous media; compilation of data on metallochromic indicators. New projects relate to: characterization of photometric methods of analysis; recommendations for information to be included in the publication of papers on analytical procedures involving ion exchange or ion exchange chromatography; terms and definitions used in conjunction with standard reference materials, SRM (REMCO project); selectivity terms used in analysis; classification of amplification methods and primary standards for titrimetric analysis.

The work of this Commission is, as always, orientated towards practical aspects of analytical chemistry and it is making good progress with most of its projects.

Microchemical Techniques and Trace Analysis (V.2)

In the past the work of this Commission has been mainly related to microchemistry but, in line with present-day needs, the emphasis is now being placed to an increasingly great extent on trace analysis.

Since the Warsaw Assembly reports have been finalized on: SRMs for trace analysis; analysis of high purity mineral acids; contamination in trace analysis; analysis of solid surfaces; multielement preconcentration by matrix precipitation.

Work is in progress on: pressurized sample dissolution for biological materials; the stability of (synthetic) standard solutions; practical limits of the determination in trace analysis; separation and preconcentration techniques; the trace analysis of organoboron compounds.

New projects in various states of activity relate to: methods of reporting accuracy and precision; standardization in organic trace analysis; evaluation of procedures for determining trace elements in biological material; graphical representation of trace and microanalytical schemes; *in situ* microanalytical methods; trace analysis of microsamples.

The Commission is in contact with Commission II.3 on the feasibility of a joint project on standardizing procedures for evaluating the chemical composition, microstructure and physico-mechanical properties of silicon carbide and nitride. The Commission is holding a meeting at the Euroanalysis III Conference in Dublin, 26 August 1978, when further progress is expected.

Analytical Nomenclature (V.3)

The Commission has conducted its work by postal communication since the Warsaw Assembly in 1977, but will meet in London on 8 December 1978. Considerable progress has been made in the meantime, though much more is expected to follow after the London meeting.

Several provisional recommendations on nomenclature have been published as PNAs in the usual way and the Commission is now collecting comments. These include precipitation methods; ion-selective electrode procedures; nomenclature of liquid-liquid extraction; nomenclature of sampling procedures. Joint projects are in progress on: exchanging sorbents; automated analysis (Clin. Chem.); activation analysis (V.7); environmental analysis (ICSU/SCOPE); presentation of results (V.1, V.2, V.7 and ISO/REMCO); photometric methods (V.1); luminescence spectroscopy (V.4) and radiochemical methods (V.7). New projects are being considered on chiro-optical methods and symbolism in analytical chemistry. Joint work on nomenclature of thermal methods of analysis is also in progress with the International Confederation for Thermal Analysis.

This Commission is very concerned that a minimal assembly schedule will completely invalidate its method of operation in conjunction with other Commissions of several Divisions of IUPAC.

Spectrochemical and Other Optical Procedures for Analysis (V.4)

A task group of this Commission is planned to produce a collection and criticism of transition probability data for eventual publication by the Union.

Adverse criticism of minor details by one member of the IDCNS has held up publication of the Commission's extensive document on X-Ray Emission Spectroscopy. The Commission has revised the document to meet some of the points, but it is concerned that one

individual should dominate what is a synthesis of many diverse international views, other than to raise discussion points that need clarification or are actually in error.

The new project on spectrochemical radiation sources is well under way and the task force charged with its initiation will meet in Paris, 11–13 September 1978, to prepare a 'first draft' for the Davos Assembly in 1979. An inter-Commission project with V.3 on 'Analytical Molecular Luminescence Spectroscopy' is progressing well. The Commission has produced a fourth revised draft to be examined by V.3 at its London (December 1978) meeting. In collaboration with CQUCC, members of Commission I.1 and Commission V.4 held a meeting in Lyons, 24–25 October 1977, to discuss revision of a series of documents entitled 'Quantities and Units in Clinical Chemistry – Optical Spectroscopy'. The opinion of IDCNS has been sought on various points of difficulty. A second document 'Practical Spectrometry', from the same source, is now being considered.

New projects being progressed are: nomenclature of X-ray emission wavelengths; radiation dispersive instrumentation; spectroscopic quantitation of low levels of environmental pollution.

No meeting of the full Commission has been arranged for 1978–79 before Davos in view of the shortage of funding. The Commission has chosen rather to let some of its task forces initiate the new projects by means of the limited funds available for the inter-Assembly years.

Electroanalytical Chemistry (V.5)

Since the 29th General Assembly in Warsaw this Commission has published two reports, namely: '*N,N'*-Dimethylformamide – purification, tests for purity and physical properties', and 'Polarographic half-wave potentials of inorganic substances in *N,N'*-dimethylformamide as solvent'. Six other reports are now in press. These relate to: a recommended terminology and symbol for the transfer of solutes from one solvent to another; recommended terms, symbols and definitions; standard potential of the Ag/AgCl electrode; conditional diffusion coefficients; selectivity of ion-selective electrodes; comparison of electroanalytical and other detectors in chromatography. Eleven other projects are nearing completion: half-wave potentials in propylene carbonate; electroanalytical techniques for environmental analysis; acid-base dissociation constants in dipolar aprotic solvents; methods of reporting electroanalytical data; inter-metallic compounds in mercury; diffusion coefficients in mercury; buffer solutions for glass electrodes at high temperatures; dissociation constants of carboxylic acids in media of high ionic strength; indicator electrodes in nonaqueous media; marine electroanalytical chemistry; purification of nonaqueous solvents and tests for impurities.

New projects now being initiated include: electroanalytical chemistry of sulfur compounds in new coal conversion technologies; critical review of individual electroanalytical techniques; half-wave potentials of organic depolarizers in hexamethylphosphoramide; response times of ion selective electrodes and potentiometric cells; recommendations for reporting characteristic potentials for nonaqueous solvents.

Inter-Commission projects being undertaken include: work on solubilities of intermetallic compounds (V.6); formation constants of metal complexes in acetonitrile (V.6); revision of Latimer's 'Oxidation Potentials' (I.1). The latter has been discussed at a series of meetings in January, February and June 1978, and a Guide to Authors has been sent out to the 12 collaborating authors. Plans have also been made for writing the basic introductory chapters and ensuring liaison between the various writers of the book.

Equilibrium Data (V.6)

This Commission has planned no meeting for 1978, but has arranged a special meeting of its Subcommittee on Solubility Product Data in Atlanta, USA, to speed up the compilation work for the IUPAC Chemical Data Series (for synopsis minutes, see p. 202). Excellent progress is being made in this respect.

Since the 29th General Assembly this Commission has published three reports: Equilibrium constants of liquid-liquid distribution reactions, Part III; Critical evaluation of equilibrium constants in solution, Part A – EDTA complexes, and Part A – Phenanthroline, bipyridyl and related compounds. A 1255 page manuscript on Stability Constants, Supplement 2: Organic Ligands, has been sent to the Secretariat for publication. The latter will supplement the previous IUPAC (Chemical Society) publication and should prove invaluable to many scientists. The Commission is now considering the continuation of this task. An inorganic ligand companion volume is scheduled for completion by the end of 1978 and another on dissociation constants of organic acids by August 1978. Two volumes have already appeared on critical surveys of solution equilibrium constants and the final version of two others dealing with complex fluorides and cyanides will shortly be ready. In Series B – 'Critical surveys of equilibrium constants in liquid-liquid distribution systems' – a survey volume on 8-hydroxyquinoline complexes is in the final stages of preparation and other surveys on high molecular weight carboxylic acids and TTA (2-thenoyltrifluoroacetone) are making good progress.

In the Data Flagging project it is proposed to have a new flag list published by a number of major journals this year. A report on Symbols for mixed ligand complexes will be forwarded in camera-ready manuscript form to the publishers by the end of 1978.

Excellent progress is being made on the Solubility Data project by the Subcommittee. The first volume, dealing with the He/Ne gas/liquid systems, has been sent to the publishers. Volume II on Kr, Xe and Rn will be completed in August/September, and Volume III on Ar is nearing completion also. The solid/liquid systems projects are also progressing well and it is anticipated that 10 volumes will be completed by the end of 1979. This substantial undertaking is arousing considerable interest amongst scientists in diverse fields. Lastly, the report on Guidelines for the Determination of Stability Constants is now being prepared and should be available within the next few months.

Analytical Radiochemistry and Nuclear Materials (V.7)

Following discussions within the Union on the formation of a Division of Nuclear and Radiochemistry and

the rejection of a subsequently proposed interdivisional commission, it was decided at the request of the Bureau that this Commission should, temporarily at least, assume responsibility for work on non-analytical aspects of nuclear and radiochemistry with effect from the 29th General Assembly in Warsaw. At the end of a two year trial period the situation would be reviewed. To this effect the Titulár membership of the Commission was allowed to expand from 8 to 10 and the Commission itself agreed to leave two Associate positions vacant for the task force. The Commission was informed that some additional Associate Members might be recruited for the new enlarged programme.

The proposed meeting of the Commission in 1978 has not yet been held because of illness of the two non-analytical members, Dr. AMIEL and Prof. PAPPAS, and it now seems unlikely that the other members of Commission V.7 will be able to meet jointly with the two new members before the next General Assembly. It is, therefore, probable that little progress will be possible on the non-analytical aspects of the Commission's new enlarged terms of reference before the Davos Assembly. However, the following new subjects have been suggested by correspondence for inclusion in the programme: (i) Preparation of radioisotopes and labelled compounds. (ii) Nuclear methods in chemical studies (isotope exchange, Mössbauer effect, positron annihilation, hot-atom chemistry, etc.). (iii) Use of radioisotopes in technology. (iv) Radiochemical aspects of nuclear fuel cycles. (v) Radioactive dating methods.

Meanwhile the Commission is making good progress with its ordinary programme. The report on Bowen Kale as a reference material has now been approved for publication in *Pure Appl. Chem.* and the finalized report 'A Glossary of Nuclear Terms' is being considered for approval by the Division Committee. The project on the compilation of radiochemical data which was withdrawn at the Warsaw Assembly is being reconsidered following receipt of a request from the Secretary of Commission II.1 (Atomic Weights) for collaboration in this area. Good progress is being made on the projects on separation techniques in radioanalytical chemistry and teaching aspects of radioanalytical chemistry; a considerable amount of work has been done on the project 'standardization of graphical presentation of radiochemical separation schemes'. Work is progressing normally on the other projects: counting errors in radioactivation analysis; recommendations for the presentation of experimental requirements for radioanalytical methods of analysis. Draft reports are now being prepared on: methods for the analysis of fissile and fertile elements; reference materials and intercomparison samples in radioanalytical chemistry; analytical aspects of the dating of carbonates and water by uranium and thorium; radioanalytical problems associated with fusion reactors.

Work is also to be carried on in the critical evaluation of radioimmunoassay and related methods and the proposal to set up a world conference on radioanalytical chemistry of nuclear materials will be reexamined at the General Assembly in Davos.

23 August 1978

T. S. WEST
President

VI. APPLIED CHEMISTRY DIVISION

Division Committee

The recommendations of the Executive Committee to combine the two Food Commissions—now firmly resolved on by the Council—and the two Pesticide Commissions have been discussed at length by the Division Committee and by the representatives of the affected groups. The Commission on Food Properties (formerly the Commission on Food Additives) proposes a membership including 8 Titular Members, 12 Associate Members, a number of national representatives and the formation of working groups as is practice of the Commission on Oils, Fats and Derivatives. The Pesticides Commissions will consider a reorganization similar to that defined for the Food Commissions. The Pesticide Commissions have contemplated abandoning review-like projects on compound groups in order to be able to concentrate on in-depth reviews on critical pesticide issues and definitions. On the other hand, the Commissions on Water Quality and on Atmospheric Environment (formerly the Commission on Air Quality) have strengthened their membership, the former now consisting of the full number of Titular and Associate Members. The Commission of Atmospheric Environment has also thoroughly revised its programme.

At the General Assembly in Warsaw the Division Committee appointed a Subcommittee on New Projects, under the chairmanship of the Division Vice-President, Dr. A. F. LANGLYKKE, with the object of providing a focus for industrial and environmental interests. The Subcommittee reported to the Division President and a separate report on the work of the Subcommittee will be made to the Bureau (for synopsis minutes, see p. 205).

The Division Committee met in 1978 in Oxford, 16–17 June (for synopsis minutes, see p. 203). In addition to the impending reorganizations and the report of the Subcommittee on New Projects, the discussions included ways to evaluate projects and to improve information concerning them, as well as liaison with other bodies within IUPAC and outside.

The Division itself is concerned with the harmonization of collaborative studies, on which a successful meeting of high organizational level was held in London in March 1978 with the Past-President, Dr. H. EGAN, in the chair [an account has been published in *IUPAC Inf. Bull.* (1978), No. 2, pp. 132–137]. Through its Past-President, the Division Committee has been in contact with the CHEMRAWN Planning Committee and will follow the organization of CHEMRAWN conferences with the idea of collaborating in the field of applied chemistry. Other projects of the Division Committee include trivial names for chemicals and reagents, which still need further standardization, and chemical problems in ocean chemistry, for which a correspondence network has been established and the liaison transferred to the Commission on Water Quality. The programmes of individual Commissions will be briefly reviewed below.

Food Properties (VI.1)*

The work of the Commission has remained concentrated on analytical methods for compounds potentially injurious to health. Methods for volatile nitrosamines and the report of a collaborative study on non-volatile nitrosamines are now in the process of publication, the former by the International Agency for Research on Cancer and the latter in *Pure Appl. Chem.* Contact has been established with the Association of Official Analytical Chemists and further information is being assembled about methods for nitrite and nitrate in food. Last year's survey in Germany has revealed the presence of a large number of *N*-heterocyclic polycyclic aromatic compounds and work is in progress to organize a collaborative study of analytical procedures. A collaborative study is also being planned for a method for multi-antioxidants in food. Other areas of interest are urethane in beverages, residues in edible products from treated livestock and the fibre content of food.

Food Contaminants (VI.2)*

There has been active cooperation with international organizations such as FAO, WHO, ISO, UNEP and IACR, which included one member of the Commission organizing a training course at the request of FAO, for 25 African Nationals. One of the main areas of interest has been in the determination of certain trace elements in food, for example, lead, cadmium, copper, selenium and tin. The other area of detailed investigation has been in the examination of mycotoxins, ranging from sampling strategy and specifications of standard preparations to the compilation of recommended methods and the organization of the IVth IUPAC Symposium on Mycotoxins and Seafood Biotoxins in 1980. The Commission has also been involved in obtaining information on food contaminants, particularly vinyl chloride, derived from food packaging, and, in cooperation with the Commission on Fermentation, is to complete a document on the testing of single cell protein (SCP), which will cover toxicological and nutritional evaluation and specify standards for SCP to be used in animal feeding stuffs.

Coordinating Committee on Food Chemistry

The main task of the Coordinating Committee has been the handling of new projects outside the present areas of the two food commissions. Such projects at present include purity specifications for food additives and rapid methods of food analysis. The latter will be incorporated in the programme of the 27th IUPAC Congress in Helsinki (1979). A project on bromide residues in foodstuffs is also under consideration.

Fermentation (VI.3)*

The potentialities of fermentation technology is well illustrated in the Commission's programme, as exemplified by the bio-conversion of cellulose substrates (which may be extended to cover the contribution of microbiology to the utilization of

*Synopsis minutes of the meeting of the Commission in 1978 have been published elsewhere in this issue under 'Reports of IUPAC Bodies'.

renewable energy and chemical sources) and by its involvement in the evaluation of single cell protein. The SCP Project is conducted in cooperation with Commission on Food Contaminants and will in future also cover SCP destined for human use. Other aspects of the programme are the fermentation power of baker's yeast (jointly with ICC), terms and symbols, education in biochemical engineering and information exchange. The Commission is also concerned with the organization of major international conferences, including the 3rd International Symposium on Genetics of Industrial Microorganisms (1978), the 6th International Fermentation Symposium (1980) and 7th International Fermentation Symposium (1984).

Oils, Fats and Derivatives (VI.4)*

The activity of the Commission is based on working groups supporting regular membership in cooperation with various international organizations, to make possible a large programme of 16 projects. The programme includes the determination of different types of substances found in oils, fats, margarines and fat products, such as total oxidized fatty acids, total fats, tocopherols, emulsifiers, *cis-cis*-linoleic acid and of compounds of more direct interest to other commissions such as chlorinated pesticides, plastic polymers and plastic-based contaminants. This last subject may prove to be a longterm project and may have to be undertaken in steps. Much of the work of the Commission has related to the publication of the 6th Edition of IUPAC Methods of Analysis of Oils & Fats, the first part of which is now ready for publication, and to the revision of older methods for unsaponifiable matter and acid value. New projects on glycerines, alkaline soaps and erucic acid have been initiated. Erucic acid especially is important since many countries are limiting the amounts contained in oils and fat blends.

Atmospheric Environment (VI.5)

The Commission was re-activated, its membership strengthened and the programme thoroughly revised at the General Assembly in Warsaw. The Commission has formed a joint Subcommittee with the Clinical Chemistry Section, established liaison with UNEP, SCOPE, ISO and ECE and commented on the WHO programme for carbon monoxide and offered assistance in evaluating analytical techniques. The new programme of the Commission is composed of environmentally oriented projects of immediate interest, including new projects on benzene, vinyl chloride, asbestos, airborne nitrosamines, and fluorocarbons and ozone.

Terminal Pesticide Residues (VI.6)

The programme of the commission is currently undergoing a change from review reports to reports in depth covering critical environmental and pesticide problems. Most of the earlier projects are almost completed. The new programme includes pesticides and nitrosamines,

on which a special report is in preparation, chlorophenols and toxaphenes, and definitions of 'terminal residues' and 'persistence'.

Pesticide Residue Analysis (VI.7)*

The reduction in the number of commission projects has been made as in the Commission on Terminal Pesticide Residues, by changing from annual general reviews to selected important topics. While the Commission on Terminal Pesticide Residues specifies the chemical nature of the residues, the Commission on Pesticide Residue Analysis deals with the suitability of analytical methodology or procedures for the intended purpose, and its programme currently covers such areas as extractability of residues, the reliability and interpretation of data and influence of post-application factors. Current assignment on methodology relates to status reports on clean-up procedures and to methods of determination. Attention has also been given to projects on confirmatory techniques, to simple methods and to cooperation with the Codex Committee on Pesticide Residues (CCPR) on recommended methods.

Coordinating Committee on Pesticide Chemistry

The Committee acts as a harmonizing body between the two pesticide Commissions and is in active liaison with various international organizations, such as CCPR, FAO, WHO and ISO. The Coordinating Committee is concerned with the organization of the IV International Pesticide Congress to be held in Zürich 24–28 July 1978, and will give its support to the V Congress to be held in Japan in 1982.

Water Quality (VI.8)*

The Commission met in Frankfurt, 11–12 April 1978 and is concerned with the organization of the 3rd International Congress of Industrial Waste Water and Wastes to be held in 1980 in Stockholm. There are also other strong industrial interests in the programme, including a survey of processes used in industrial waste water treatment and of possible future techniques. The programme includes aspects of nomenclature and education in hydrochemistry. The Commission will also work in cooperation with other organizations, notably with ISO and with the ICSU Scientific Committee on Ocean Research (SCOR), and will continue the contact with the ICSU Scientific Committee on Water Research (COWAR).

Reclamation of Solid Wastes (VI.9)

The Commission completed the general survey of reclamation of solid wastes in 1977 and found it convenient to focus its attention on more restricted areas. The most neglected aspect was considered to be reclamation of waste plastics. Chemical, microbiological, engineering and social aspects of the subject are under study.

28 July 1978

H. SUOMALAINEN
President

*Synopsis minutes of the meeting of the Commission in 1978 have been published elsewhere in this issue under 'Reports of IUPAC Bodies'.

REPORTS OF IUPAC BODIES

CHEMICAL RESEARCH APPLIED TO WORLD NEEDS (CHEMRAWN) PLANNING COMMITTEE

Meeting at Zürich (Switzerland): 22 February 1978

1. *Minutes of Previous Meeting.* The minutes of meeting in Warsaw on 15 August 1977 [see *IUPAC Inf. Bull.* (1978), No. 2, pp. 80–81] were formally approved.

2. *Committee Membership.* Prof. ZOLLINGER will become an *ex officio* member of the Committee when he becomes President of IUPAC. There was considerable discussion concerning his replacement and possible expansion of the Committee. It was proposed that the Committee not be changed further until the Davos meeting, including the appointment of a Vice-Chairman and Secretary. The possible appointment of Associate Members will be discussed with the Executive Committee.

3. *World Conference on Future Sources of Organic Raw Materials (Toronto, Canada: 10–13 July 1978).* Dr. ROSSITER reported in detail on the present status of the program and publicity for this Conference. The Committee felt it would be very beneficial for IUPAC to sponsor a luncheon meeting of industrial representatives during the Toronto Conference to attract new Company Associates and discuss industry's interest in CHEMRAWN activities. Dr. BARRETT will contact the Executive Committee about this.

4. *Future 'World Conference on Chemistry, Agriculture, and World Food Supply'.* Contact with knowledgeable people and organizations indicate there is considerable interest in this topic. Such a conference preferably should be held in a developing country. In this case, financing should come largely from funding institutions and not attendance fees. Prof. BEHRENS proposed a two-step procedure: first, a series of workshops, probably in developing countries, to identify problems; second, a larger conference in which the results of the workshops would be presented and amalgamated. Dr. WILLIAMS recommended strongly that a paper on CHEMRAWN be presented in connection at the UN Conference on Science and Technology, 1979. Before the next Committee meeting, contacts will be made with organizers of this Conference to determine advisability of such a presentation. Contacts will also be made with experts in the agricultural field for a preliminary evaluation of strategies. A preliminary study will be made of the practicability of holding conference(s) in a developing country and/or in Europe, including the financial support. The results of these investigations will be evaluated at the next CHEMRAWN Planning

Committee meeting in light of the experience and results from the Toronto Conference.

5. *Possible Additional Conferences.* Conferences on the environment and corrosion were proposed. Dr. BARRETT will ascertain from industry their interest in a suitable environmental-related conference, perhaps in conjunction with SCOPE. It will be suggested to the Bureau as well as to the organizers of the IUPAC Congress in 1981 that corrosion be included as a major Congress topic.

6. *Guidelines for CHEMRAWN Activities.* Dr. EGAN stated that the Division should be better informed about CHEMRAWN and the CHEMRAWN Planning Committee should become more aware of the activities of the various Divisions. The CHEMRAWN Planning Committee invites input from Divisions and Commissions. Perhaps this can best be done by a question in the symposium questionnaire.

7. *Next Meeting.* The next meeting will be held on 13 July 1978 at the Royal York Hotel in Toronto, Canada.

Present: Dr. B. W. ROSSITER (Chairman), Dr. J. W. BARRETT, Prof. D. BEHRENS, Dr. H. EGAN, Prof. G. E. ZAIKOV, Prof. H. ZOLLINGER. In part: Dr. M. WILLIAMS and Miss A. TROUGHTON (IUPAC Secretariat).

IUB—IUPAC JOINT COMMISSION ON BIOCHEMICAL NOMENCLATURE (JCBN)

Meeting at Washington DC (USA): 9–13 June 1978

1. *Meeting.* The meeting was held jointly with the Nomenclature Committee of the International Union of Biochemistry (NC-IUB), and also two sessions were held jointly with the Committee of Editors of Biochemical Journals (CEBJ).

2. *Membership.* The members noted with sorrow the death of Prof. KLYNE. The Chairman welcomed Dr. G. P. MOSS in his place, and also welcomed Prof. H. BIELKA as a new member of NC-IUB.

3. *Document Classification.* At one of the joint sessions with CEBJ it was agreed to modify slightly the document classification, as follows: (i) Preliminary draft, to apply to documents at early stages of consideration only by expert panels and the nomenclature committees; (ii) Discussion draft, to apply to documents being discussed between nomenclature committees and other bodies, e.g. CEBJ; (iii) Draft for publication, to apply to

documents when the nomenclature committees thought that they had met the points raised by other bodies, but the label should not inhibit raising of further points, since such a draft, like others, could go through many versions; (iv) Final draft, to apply to documents ready for seeking approval of IUB and of IDCNS for IUPAC; (v) Approved document, to apply once formal approval from IUB and IDCNS had been received.

4. *Compendium of Nomenclature Recommendations*. Dr. LIÉBECQ reported that the Compendium about to be published for CEBJ contained all the documents of the (old) CBN and many IUPAC documents in related fields of biochemical relevance.

5. *Enzyme List*. NC-IUB considered the new edition of Enzyme Nomenclature that is about to be published, and JCBN members advised on many aspects. The new edition is being published by Academic Press for IUB, and will contain 2200 entries. Several appendices were considered and approved. It was decided to set up expert panels to advise on topics for the following edition of the list and conveners were named for most of them: oxidases and oxygenases (H. S. MASON); carbohydrate nomenclature as used in naming enzymes (J. J. MARSHALL); nucleic acid polymerases (H. BIELKA); enzymes methylating nucleic acids (H. BIELKA); transferases.

6. *Subjects under Consideration*. Approval would soon be sought for a document on '*tetrapyrroles*'. Documents on '*monosaccharide conformation*' and on '*branched-chain monosaccharides*' were approved and would be circulated for comments; one on '*unsaturated monosaccharides*' was likely to follow soon. These were related to NC-IUB preliminary drafts on abbreviated nomenclature for '*oligosaccharide*' and '*polysaccharide*' chains which were considered and questions were referred back to the panel that had produced them. Panels were also considering '*polysaccharide conformation*' and '*polynucleotide conformation*'. Panels were at work on '*Vitamin D*' and on '*catecholamines*', and it was decided to convene panels on '*prostaglandins*', '*lipoproteins*' and '*glycoproteins*'. The situation on '*symbols of enzyme kinetics*' was also considered, and formation of a panel was left for future consideration.

7. *Letter on F-Rules*. A draft of a letter by the Chairman and Secretary to publicize the F-Rules and invite formation of panels was considered and given general approval.

8. *Next Meeting*. The committees agreed to meet in Killarney, Ireland in June 1979 and CEBJ decided to meet there as well.

Present: P. KARLSON (Chairman), B. L. HORECKER, C. LIÉBECQ, B. LINDBERG (nominated by IUB); H. B. F. DIXON (Secretary), G. P. MOSS, Y. JEANNIN, K. L. LOENING (nominated by IUPAC). *Other Members of NC-IUB*: H. BIELKA, W. B. JAKEBY, B. KEIL, E. C. WEBB. *Observers*: E. C. SLATER, W. J. WHELAN (IUB); R. DYBKAER (IUPAC Section on Clinical Chemistry).

COMMISSION ON QUANTITIES AND UNITS IN CLINICAL CHEMISTRY (CQUCC)

Giessen (FRG): 10–12 April 1978

The meeting was held jointly with IFCC Expert Panel on Quantities and Units (EPQU).

1. Minutes of CQUCC/EPQU meeting in Warsaw (13–16 August 1977) and of joint meeting of Commissions I.5, V.4 and CQUCC in Warsaw (14 August 1977) were approved. According to IUPAC recommendations future minutes will be prepared in a shorter form.

2. Main reports from members on developments since August 1977 are as follows:

– MÉTAIS reports that in France implementation of SI in clinical chemistry is speeding up and a number of hospitals will introduce the new system from January 1979.

– SIGGEARD-ANDERSEN reports that in pharmacology, in the Scandinavian area, mass concentration units are still preferred to units in terms of amount of substance.

– ZENDER reports on the Lyon joint meeting, with Commissions I.5 and V.4 (held 24, 25 October 1977) devoted to the revision of document 'Optical Spectroscopy: Part 1'. The document has now been passed on to IDCNS for approval. It should be published in 1978 as a provisional recommendation (see pp. 241–260).

– The 1977 definitive recommendations have been approved by IFCC Council in Mexico in February 1978. These recommendations are in the hands of R. DYBKAER and should be published in *Clin. Chim. Acta* and possibly also in *Pure Appl. Chem.*

3. A list of new publications on quantities and units in clinical chemistry was presented; the list is available from R. ZENDER.

4. EPQU/CQUCC makes no proposal presently for the nomination of the sixth Titular Member of IFCC Panel and IUPAC Commission. The matter will be rediscussed at the next meeting.

5. The document from WHO *The SI for the Health Professions*, published early in 1978, is considered by EPQU/CQUCC as a major advance towards the implementation of SI worldwide. The high quality of this document is stressed.

6. Draft minutes of the open meeting of EPQU in Mexico (held 28 February 1978) have been sent to all members and associate members of EPQU and of CQUCC.

7. The document 'Spectroscopy: Part 2—Practical Spectrometry' was partly revised during the meeting and will be presented in the form of draft 3 by P. MÉTAIS and K. JØRGENSEN at a joint meeting with Commissions I.5 and V.4 (Paris, September 1978).

8. The document 'Guidelines for Listing Specifications of Absorption Photometers in Clinical Chemistry' that

was sent by Prof. R. HAECKEL of the IFCC Expert Panel on Instrumentation was revised and discussed. EPQU/CQUCC thinks that this document would duplicate the one that we have in project under the title 'Spectroscopy: Part 4'. ZENDER will make the necessary contact to see if this can be avoided.

9. The document 'Optical Spectroscopy: Part 3—Molecular and Atomic Emission and Absorption Spectrometry in Physical Chemical Plasmas' was extensively revised during the meeting. Draft 3 of this document will be prepared by HERRMANN, with ONKELINX, before September 1978, and, at that stage, it will be submitted to the other IUPAC Commissions interested as well as to IFCC Committee on Standards.

10. SIGGEARD—ANDERSEN presented the new version of stage 1, draft 1 of the 'Table of Symbols and Definitions of Quantities related to the Standard Chemical Potential and the (relative) Activity of a Solute in a Solution'. The document was revised and more particularly agreement was reached concerning the format that OLÉ proposes for the presentation of 'kind of quantity' including specifications of system and often of component.

11. New draft-documents will be prepared, for January 1979, on:

—Changes in Properties with Time—C. ONKELINX in collaboration with R. DYBKAER

—Intensive Derivatives of Extensive Quantities—B. VISSER in collaboration with C. RIGG.

12. It was decided that no other meeting of EPQU—CQUCC will take place this year. The next meeting is scheduled for January 1979, either in the Netherlands or in Copenhagen.

Present: R. ZENDER (Chairman), R. HERRMANN, C. ONKELINX, O. SIGGAARD-ANDERSEN, B. VISSER (Titular Members CQUCC and EPQU), P. MÉTAIS (Associate Member CQUCC).

COMMISSION ON TOXICOLOGY IN CLINICAL CHEMISTRY (CToCS)

Meeting at Kristiansand (Norway): 23–25 May 1978

1. *Introductory Business.* The Chairman opened the Meeting, on the occasion of the 1st Conference on the Environmental and Occupational Toxicology of Nickel, and welcomed the new Members of the Commission. The Minutes of the 6th Meeting of the Commission, held in Warsaw during 13–14 August 1977 [see *IUPAC Inf. Bull.* (1978), No. 2, p. 85] were approved.

2. *Monte Carlo Symposium on Toxic Metals.* The Conference Treasurer, Dr. TONKS, summarized the final statement of account, and the Editor, Dr. BROWN, reported on the sales of the Conference Proceedings.

3. *Cadmium Subcommittee.* Dr. STOEPLER reported on plans for inaugurating this subcommittee, and for

its first scientific meeting. It was proposed that the second meeting be held in Davos (Switzerland) on 3 September 1979.

4. *Cholinesterase Subcommittee.* Dr. BROWN outlined the status of the review on Serum Cholinesterases and expected that a fair draft would be available for refereeing by the Commission later in 1978.

5. *Nickel Subcommittee.* Prof. SUNDERMAN noted that the findings of the first three inter-laboratory comparisons of nickel analyses in plasma and urine would shortly be published, and Dr. STOEPLER agreed to draft an optimised analytical protocol. Dr. KASPRZAK's monograph on ^{63}Ni had been edited, and Prof. SUNDERMAN agreed to prepare a final version for refereeing by the Commission before submitting it for publication in *Pure Appl. Chem.* It was proposed that the subcommittee meet again in Davos (Switzerland) on 4 September 1979.

6. *Brussels Symposium, July 1980.* Several different plans for a Symposium on Drug-orientated Analytical Toxicology, to be held jointly with the European Society of Toxicologists, were discussed with its President, Prof. TSCHOU. A decision as to the most suitable plan was deferred until 1 September 1978, when Prof. TSCHOU would have consulted his colleagues.

7. *Barcelona Symposium, March 1981.* Dr. BROWN reported that preliminary plans for this Symposium, on Organ-specific Toxicity, were proceeding smoothly in collaboration with Dr. DAVIS, for the IUPHAR Section on Toxicology.

8. *Second Symposium on Toxic Metals.* The Commission discussed alternative plans for holding a sequel to the Monte Carlo Symposium, and Dr. MIKAC—DEVIC agreed to explore the possibility of a venue in Yugoslavia in 1982.

9. *Next Meeting* of the Commission will be held in Davos (Switzerland), 5–6 September 1979.

Present: F. W. SUNDERMAN, JR. (Chairman), S. S. BROWN, M. G. MERCIER, J. SAVORY, D. TONKS (Titular Members); M. MIKAC—DEVIC, M. STOEPLER (Associate Members); J. SCHOU (Observer).

SUBCOMMITTEE ON CALIBRATION AND TEST MATERIALS (of Commission I.4)

Meeting at Paris (France): 8–9 May 1978

1. *Joint Meeting with CIPM*

A part of the meeting was held jointly with Working Group II of the Consultative Committee on Thermometry of the Comité International des Poids et Mesures (CIPM).

The subject for discussion was the need for and use of reference materials for temperature measurement and a joint meeting of the two committees was desirable because they are both engaged in making

recommendations on this subject, albeit with different ends in view. Notwithstanding some divergencies of opinion about the need for reference materials for temperature measurement agreement was reached about the utility of thermometric reference materials for specific purposes (e.g., calibration of melting-point apparatuses for organic substances) and a working agreement was reached, as far as each committee could commit its parent body, how we should proceed in future. This may be summarized as follows:

(i) Working Group II is responsible for revision of the Secondary Reference Points of IPTS, and its previous recommendations have been incorporated in the amended edition (1975) of IPTS-68. It is expected that when IPTS is next revised, which will not be earlier than 1983, the Secondary Reference Points, which are not part of the scale, will be deleted from the text. This will remove ambiguity about their status and allow them to be revised more easily than at present. Working Group II has already published an extended list of secondary reference points in *Metrologia*, and is considering what advice to offer for their use.

(ii) The IUPAC Subcommittee is concerned with temperature reference points primarily for use in organic chemistry, covering the range 220 K to 600 K, and for this purpose the most suitable points are the solid-liquid transitions of organic compounds, only two of which are included in the IPTS list. We shall therefore seek to establish such a range of points, and it was foreseen that ultimately some of these might be suitable for adoption by Working Group II.

(iii) It was agreed that liaison between the two committees should be continued by exchange of working papers. In fact, there is no problem in liaison with the present membership since Prof. CROVINI is both chairman of Working Group II and a member of the IUPAC Subcommittee.

2. Meeting of the Subcommittee

In a separate meeting the IUPAC Subcommittee decided that the reference points it recommends should not be 'melting points', which are measured with a relatively rapidly changing temperature and subject to indeterminate instrumental errors, but that they should be near-equilibrium values of freezing-melting temperatures. The accuracy sought in these values would be 0.01 K. Prof. MILAZZO has been working with Prof. CROVINI on the determination of some suitable points; they explained the apparatus they had developed for the purpose, and Prof. MILAZZO stated that the Italian delegation will be proposing a cooperative programme of work on reference materials for temperature measurement to the Bureau Communautaire de Reference of the EEC in the autumn.

Working Group II acknowledged the interest of the IUPAC Subcommittee in its field, and it was felt by the Working Group that they had reached a better understanding of the specific needs for reference materials in this field as a result of the discussions. Future cooperation is planned. The Subcommittee on Calibration and Test Materials decided that the reference points it recommends in this field shall be of higher quality than was at one time envisaged.

Present: Dr. T. J. QUINN (Chairman), Prof. L. CROVINI, Dr. R. E. BADFORD and Dr. H. MASS (Working Group II); Dr. D. AMBROSE, Prof. H. KIENITZ, and Prof. G. MILAZZO (Subcommittee on Calibration and Test Materials); Mr. G. GIRARD and Mr. J. BONHOURE (Bureau International des Poids et Mesures).

COMMISSION ON NOMENCLATURE OF INORGANIC CHEMISTRY* (II. 2)

Meeting at Oxford (UK): 11–16 September 1978

1. *Minutes of Previous Meeting.* The minutes of the meeting held at Jablonna Palace, Poland on 9–14 August 1977 [see *IUPAC Inf. Bull.* (1978), No. 1, pp. 36–37] were accepted with minor amendments.

2. *Membership.* There were no changes in membership, but three additional National Representatives, Prof. A. ROMAO DIAS (Portugal), Prof. H.H. EMONS (German Democratic Republic) and Dr. M. ZIGMUND (Czechoslovakia), had been approved during the previous year.

3. *Names of the Heavy Elements.* The document prepared in Jablonna in 1977 and which had been referred back by IDCNS, was reconsidered, amended and redrafted for immediate resubmission to the President of the Division.

4. *Status Reports.* Reports on the present status of the following items were received: (a) Nomenclature of Hydrides of Nitrogen; (b) Isotopically Modified Compounds; (c) Stereochemical Nomenclature; (d) Iron-sulfur proteins; (e) Nomenclature of Tetrapyrroles; (f) The Designation of Coordination Sites in Ligands; (g) Nomenclature of Organometallic Compounds.

It was noted that items (a) and (b) should appear in provisional form during the coming year. Publications on the designation of coordination sites in ligands by BUSCH and SLOAN and LEIGH have appeared in *Inorganic Chemistry* and Dr. LEIGH was advised to obtain comments on these documents from leading research groups in transition metal, organometallic and coordination chemistry. It was reported that the document on the Nomenclature of Organometallic Compounds (Section D), which is a joint publication with the Commission on Nomenclature of Organic Chemistry (III. 1), is to be reprinted, after minor modification, and bound together with the other Sections of the Rules for Organic Chemistry. The Commission was strongly of the opinion that Section D could not be considered as a mature nomenclature document and that it should retain its provisional status.

5. *Revision of the Nomenclature of Inorganic Chemistry. Second Edition, 1970 (The Red Book).* The revision of the Nomenclature of Inorganic Chemistry was considered in the light of a user survey undertaken by Dr. LEIGH and it was decided that a

*The Commission is well known in its abbreviated form: CNIC.

complete rewriting was necessary to overcome its well recognized deficiencies. Three Working Parties were established to provide reports which would form the basis of introductory chapters in the following areas: (a) Functions and Methods of Chemical Nomenclature; (b) Grammar of Nomenclature, the Use of Brackets, Punctuation, Abbreviations, Locants, etc.; (c) The Names of the Elements, their Symbols and Names for Groups of Elements. A steering Working Party to produce a plan for the rewriting process was also established.

6. *Nomenclature of Boron Compounds.* A detailed proposal from Prof. ADAMS was considered by the Commission and guidelines for its further development were agreed upon. A comprehensive plan for boron nomenclature in its entirety from Dr. POWELL, Prof. FERNELIUS and Prof. EVANS was also presented to the Commission.

7. *Polyanion Nomenclature.* The Commission noted with approval the very significant progress which Prof. JEANNIN and Dr. FOURNAU were making in this field.

8. *Ring and Chain Nomenclature.* Dr. BUSCHBECK reported on the discussions of a small *ad hoc* Committee which met at the last Inorganic Rings International Symposium at Göttingen to discuss the nomenclature of inorganic ring compounds. The Commission's Working Party in this area was instructed to prepare a document proposing specific rules for naming such compounds based on the proposals made at Göttingen.

9. *Reports Submitted to the Commission.* The Commission considered a large report from the Commission on Physical Organic Chemistry (III. 2) entitled *Glossary of Terms* and noted with approval the attempt to define terms in this area. It was recognized that a number of terms were relevant also to inorganic chemistry and the Chairman was requested to communicate to Commission III.2 some additions and corrections to the document.

The document from the Association for Science Education (ASE) entitled *Chemical Nomenclature, Symbols and Terminology* was examined. The Commission agreed that it had not had sufficient time to approve the inorganic sections of the document, but it expressed its admiration for the schoolmasters' efforts to develop good nomenclature practices in chemistry teaching.

Present: Prof. J. CHATT (Chairman), Prof. Y. JEANNIN (Vice Chairman), Dr. D. M. P. MINGOS (Secretary), Prof. L. F. BERTELLO, Dr. K. CH. BUSCHBECK, Dr. G. J. LEIGH, Prof. B. F. MYASOEDOV, Dr. W. H. POWELL (Titular Members); Prof. R. M. ADAMS, Dr. D. H. BUSCH, Dr. T. D. COYLE, Prof. E. FLUCK, Prof. J. REEDIJK, Dr. E. SAMUEL (Associate Members); Dr. Mrs. P. FODOR-CSÁNYI, Prof. A. ROMAO DIAS, Prof. K. SAITO (National Representatives); Mr. E. W. GODLY, Dr. M. GREEN, Dr. W. E. LINDSELL, Dr. T. E. SLOAN and Prof. K. YAMASAKI (Observers).

COMMISSION ON HIGH TEMPERATURES AND REFRACTORY MATERIALS (II. 3)

Meeting at Dubrovnik (Yugoslavia): 29 June–1 July 1978

1. The Chairman reported that FOEX had published the report on the melting point of Y_2O_3 . He will prepare a translated summary for publication in *Pure Appl. Chem.*

2. Dr. HOCKING has sent in his annual report which shows that *High Temperature Bibliography* is still financially sound. DE MARIA will take further action following his contact with National Representatives.

3. FITZER and HORTON will prepare a series of publications for inclusion in *Pure Appl. Chem.* on the conclusions of the International Committee on Carbon about the characterization of carbon.

4. On the carbide–carbon eutectics KOMAREK will report in Davos on the feasibility of the best of these systems, up to 3000°C.

5. SERSALE will gather an international Collaborative Study Group for the analysis of raw materials for Si-carbide and -nitride. KOMAREK will contact GRASSERBAUER (Commission V.2) about it.

6. OHSE will prepare, as a first step, a literature survey, with assistance of the Collaborative Study Group, about thermodynamic and transport properties of the alkaline metals. YAKIMOVISK will stimulate cooperation with Soviet scientists.

7. JAKES will send some fully stabilized zirconia-tubes which ANTHONY will distribute, together with possibly two other types of tubes, to about 12 laboratories for measurements. These will be from 600–1000°C and with some designated electrode systems.

8. HLAVÁČ will incorporate the results of COUTURES in a report, to be published in *Pure Appl. Chem.*, on fusion data for oxides.

9. GILLES will be asked to present his final conclusions concerning the earlier vapour pressure study. ALCOCK and DE MARIA will present a report on thermochemical data for 12 chosen metallic elements at Davos.

10. RUFFINO has published his promised paper on pyrometry. ANTHONY will now ask TRAVERSE to write a paper on experimental determination of temperatures using secondary standard materials. HORTON will report on the status of the ASTM procedure.

11. ALCOCK will form an international Collaborative Study Group to prepare a High Temperature Thermochemical Data Bank for serial publication in *High Temperature Bibliography*.

12. After discussions, letters were sent to the President and Secretary of the Division about: (i) proposed rules for the Division and (ii) the proposal of a minimum schedule for the IUPAC Assembly.

13. Some consideration was given to nominations for election to the Commission in 1979. Letters requesting acceptance of nomination will be sent.

14. The Commission proposes to organize a session for the next ETPC meeting in Belgium in 1980 and hold a Commission meeting there.

Present: Prof. C. B. ALCOCK (Chairman), Prof. G. D. RIECK (Secretary), Dr. M. A. ANTHONY, Prof. G. DE MARIA, Dr. J. HLÁVAČ, Prof. K. KOMAREK (Titular Members); Prof. E. FITZER, Dr. W. S. HORTON, Dr. R. W. YAKIMOVISK and JAKES (Observers).

COMMISSION ON NOMENCLATURE OF ORGANIC CHEMISTRY* (III.1)

Meeting at Paris (France): 2–8 September 1978

1. *Minutes of Previous Meeting.* The minutes of the meeting held at Jablonna Palace, Poland on 5–10 August 1977 had been published in *IUPAC Inf. Bull.* (1978), No. 1, pp. 35–36.

2. *Reprinting of Nomenclature of Organic Chemistry, Sections A, B, C, D, E, F and H.* Material corrections have been made in all Sections. Revisions have been introduced in Section D. Publication of the combined rules is planned for 1979.

3. *Nomenclature of Organic Chemistry, Sections A, B, C, D, E, F and H (Revised Rules).* Working groups were formed for the further development of Sections A, B, C, D, E, F and H. Division of the work is as follows:

0. General principles of name construction
 1. Parent hydrides
 2. Radicals as substituents of parent hydrides
 3. Functional groups (also radical ions, free radicals and ions)
 4. Coordination nomenclature
 5. Stereochemistry
 6. Natural Products and Related Compounds
 7. Labeled Compounds

A meeting of the working party is planned for 29–31 January 1979 in Paris, France.

4. *Systematic Nomenclature (Section G).* Working groups were reorganized for: (i) the development and extension of nomenclature rules; (ii) the evaluation of new nomenclature systems and reconsideration of old ideas and systems; (iii) creation of a new comprehensive systematic nomenclature.

The work will be divided as follows: (a) evaluation of principles; (b) ions and radicals, (c) stereochemistry; (d) fused-ring nomenclature; (e) acid nomenclature; (f) phane nomenclature; (g) natural products and related compounds.

5. *Hantzsch-Widman Names for Heteromonocycles.* A final document was agreed on. It will be sent to IDCNS by 3 October 1978 for final approval before publication in *IUPAC Inf. Bull.*

*The Commission is well known in its abbreviated form: CNOC.

6. *Nomenclature of Hydrides of Nitrogen and Derived Cations, Anions and Ligands.* CNOC discussed this document and Dr. W. H. POWELL was delegated to advise CNIC of the suggested changes from CNOC.

7. *Stereochemical Definitions and Notations Relating to Polymers (30 May 1978).* This document was reviewed and suggested changes have been sent to Prof. A. D. JENKINS, Chairman of the IUPAC Commission on Macromolecular Nomenclature.

8. *Tetrapyrroles.* Dr. K. L. LOENING had collated all comments received on this document and had distributed the corrected version. CNOC considered this document and reaffirmed its approval of it.

9. *Membership.* CNOC noted with great regret the death of Prof. W. KLYNE, a Titular Member. Prof. N. LOZAC'H had been appointed to fill the resulting vacancy.

10. *Next Meeting.* In 1979 CNOC will meet in Davos, Switzerland, for the period 22–28 August.

Present: Prof. J. RIGAUDY (Chairman), Mr. S. P. KLESNEY (Secretary), Dr. K. HIRAYAMA, Dr. K. L. LOENING, Prof. N. LOZAC'H, Dr. G. P. MOSS (Titular Members); Dr. D. ECKROTH, Dr. J. H. FLETCHER, Prof. D. HELLWINKEL, Dr. A. McNAUGHT, Dr. W. H. POWELL, Prof. J. RICHER (Associate Members); Prof. R. PANICO (France), Dr. E. MEYER (USA) (Observers).

COMMISSION ON PHYSICAL ORGANIC CHEMISTRY (III.2)

Meeting at York (UK): 3–8 September 1978

Three meetings of Titular Members of the Commission were held in York (UK) during the 4th IUPAC Conference on Physical Organic Chemistry. The occasion of the Conference afforded an opportunity to present the Commission's work to the chemical public. Accordingly, the Chairman, Prof. J. F. BUNNETT, outlined to the Conference the history, tasks and aims of the Commission and gave a brief description of the eight working parties. He described in detail the progress of the working party that he chairs dealing with the naming of simple (substitution, addition, and elimination) transformations. Prof. V. GOLD (Chairman of the working party dealing with the definition of terms) and Prof. M. J. PERKINS introduced the 3rd draft of the Glossary of Terms, copies of which had been distributed to participants on arrival at the Conference. In addition, poster presentations were made by Profs. BUNNETT and PERKINS, and by the chairmen of two of the working parties concerned with the naming of reaction mechanisms, Drs. JACKSON and LITTLER. It was emphasized to the Conference that the Commission welcomed criticisms and suggestions concerning its work, and it was gratifying to note the interest expressed.

These comments and the reports of the working parties were discussed at the commission meetings. Concerning the 3rd draft of rules for the naming of simple transformations, consideration of members'

suggestions and comments received during the Conference led to unanimous agreement on a nomenclature system. Prof. BUNNETT agreed to prepare a 4th draft incorporating modifications adopted in the York sessions. The fourth draft, after circulation to members for correction of possible minor errors, is to be sent to the Division Committee for approval prior to publication in *IUPAC Inf. Bull.* Future work of the party was discussed and it was decided to extend the basic system to other types of reactions. Dr. JONES agreed to chair a working party concerned with such extensions, and Dr. PAGE agreed to participate in the work.

Prof. MARCH reported that his working party on the naming of complex transformations had essentially completed its task of identifying the named reactions in the *Chemical Abstracts*, List of Index Headings, and would begin to classify these reactions according to bond changes.

The Commission decided it would be premature to discuss the progress of the working parties dealing with the naming of pericyclic transformations (Prof. K. N. HOUK) and oxidation-reduction transformations (Prof. M. P. DOYLE) but it was noted that the basic requirement of these working parties, namely the establishment of a system for the naming of simple transformations, had now been achieved.

Concerning the working parties on the naming of reaction mechanisms, two of the chairmen, Drs. JACKSON and LITTLER, and one of the members, Dr. M. LILER, reported in person. The meeting encouraged Dr. LITTLER who had completed his task to submit his scheme for publication.

It was noted that some of the schemes developed independently by the working parties had a common basis and it was resolved to ask the chairmen to investigate the possibility of moving towards unification of their efforts. It was recommended that the 3rd draft of the Glossary of Terms be substantially reworked and Prof. GOLD agreed to prepare a 4th draft for consideration by the Chairman.

It was decided not to pursue the establishment of a working party to deal with a graph-theoretical treatment of reactions.

The Commission will meet on 4–6 September 1979 in Davos, Switzerland.

Present: Prof. J. F. BUNNETT (Chairman), Prof. H. ZOLLINGER (Past Chairman), Dr. J. R. PENTON (Secretary), Prof. V. GOLD, Prof. G. ILLUMINATI, Prof. M. J. PERKINS, Prof. K. SCHWETLICK, Dr. J. TOULLEC (Titular Members); Dr. R. A. Y. JONES, Prof. J. MARCH (Associate Members); Dr. J. S. LITTLER, Dr. M. I. PAGE (Wates Bursaries Fellows), Dr. F. GOMEZ CONTRERAS (Ciba Foundation Fellow); Prof. M. L. BENDER, Dr. R. A. JACKSON, Dr. M. LILER and Prof. R. MORE O'FERRALL (Working Parties).

MACROMOLECULAR DIVISION COMMITTEE

London (UK): 29 August 1978

1. *Minutes of Previous Meeting.* The minutes of the Committee Meetings, held in Warsaw on 12 and 17 August 1977 [see *IUPAC Inf. Bull.* (1978), No. 2, pp. 101–102] were approved.

2. Current Status of IUPAC Sponsored Symposia 1978

- International Symposium on Polymer Dispersions, Dresden (GDR), 4–6 September. Prof. R. C. SCHULZ was appointed official representative of IUPAC at the symposium.
- 25th International Symposium on Macromolecules, Tashkent (USSR), 17–21 October. Prof. KABANOV reported that the final programme was printed, 1000 participants from the USSR were registered and 500 from abroad. Prof. OVERBERGER observed that the proposal of the organizers to publish some of the presented papers in both *Vysokomolekulyarnye Soyedineniya* and *Journal of Polymer Science* would meet with difficulties because of US copyright regulations.

1979

- 5th Conference on Modified Polymers, Bratislava (Czechoslovakia), 2–5 July. IUPAC sponsorship for this meeting had been granted by the Executive Committee, in agreement with Prof. KABANOV.
- 19th Microsymposium: Recent Aspects of Mechanisms of Degradation and Stabilisation of Hydrocarbon Polymers, Prague (Czechoslovakia), 9–12 July.
- 20th Microsymposium: Microcalorimetry of Macromolecules, Prague (Czechoslovakia), 16–19 July (Sponsorship of both meetings had already been approved by the Division Committee).
- 27th IUPAC Congress, Helsinki (Finland), 27–31 August.
- 26th International Symposium on Macromolecules, Mainz (FRG), 17–21 September. Prof. SCHULZ reported that 500 short communications were proposed for presentation; duly organized poster sessions were recommended by the Committee in order to cope with such a large number of papers. The plenary lectures would be published in *PAC*.
- Microsymposium on Polymeric Amines and Ammonium salts, Ghent (Belgium), 24–26 September. Sponsorship of this meeting organized by Prof. E. J. GOETHALS, was approved by the Committee.

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- International Symposium on Macromolecules: Structural Order in Polymers, Florence (Italy), 7–13 September. For this meeting organized on the occasion of the 25th anniversary of the stereospecific polymerization of propylene (originally planned to be held in Pisa) sponsorship had already been approved by the Committee. Prof. FARINA gave detailed information on the programme.
- 3rd International Symposium on PVC, Cleveland, Ohio (USA), June 1980. The Committee agreed to grant sponsorship for this meeting proposing Dr. DE VRIES as the Division's representative on the programme Committee.
- 21st Microsymposium: Ring-opening Polymerization of Heterocycles, Carlsbad (Czechoslovakia), 15–20 September and
- 7th Discussion Conference: Polymer Networks, Carlsbad (Czechoslovakia), 22–27 September. Sponsorship, requested by Prof. KALAL was approved by the Committee for both meetings.
- The Committee also supported the Symposium 'New Frontiers in Polymer Chemistry and Polymer Applications', Madras (India), 7–11 January, subject to

the formation of a more representative national organizing and programme Committee and more detailed information about the programme made available in due course.

- The Committee acknowledged the intention of holding the 27th International Symposium on Macromolecules in France (probably Strasbourg) either in 1981 or 1982 and expressed the hope to receive in the near future a definite proposal from the French organizers.

3. Education and Training in Polymer Science and Technology. Publication of a revised version of Prof. SHELDON'S report: In order to enable the Committee to make a final decision at the next meeting in Davos all Division members were invited to send their comments on the original version distributed in 1977, to Prof. BAMFORD, before 1 November 1978, who will transmit the Division's observations and additions (in particular those to be provided by Prof. KABANOV on the situation in USSR) to Prof. SHELDON. The revised version would be sent to all members at least one month before the meeting in Davos.

Prof. SMETS presented a communication on the UNESCO Experts Committee on Polymer Science, Industry and Environment which was to hold its first meeting in Leuven (Belgium), 8–10 November 1978, in order to discuss in particular two themes: (i) Relations between University and Industry, and (ii) Environmental Problems in Relation with the Plastics Industry. A written report on this first meeting would be prepared by Prof. KABANOV for presentation at the Division Committee meeting in Davos.

4. Macromolecular Division Rules. The Secretary had not received any further comments from the Division on the revised version distributed in 1977; he commented on the revisions proposed by Dr. WILLIAMS and confirmed that the Bureau would be asked to recommend approval of the Rules by Council at Davos. In accordance with Rule No. 4, it was decided that approval or reapproval of nominations of National Representatives would be discussed at each Committee Meeting during a General Assembly.

5. Election of new Members in Davos. It was agreed that 3 elections would be held in Davos on 2 September 1979: (i) re-election of the present Secretary for 2 years or election of a new Secretary for 4 years (only Full Members are eligible); (ii) election of 5 (or 6) new Full Members; (iii) election or re-election of coopted Members (4 coopted Members: HEINZE, KEPES, SAUNDERS, VAKULA may be re-elected; resigning Full Members are eligible). Nominations for election or re-election should be mailed to the Secretary before 1 June 1979; definite lists of nominations to be mailed by the Secretary to all Division Members at least one month before the elections.

6. Periodical Publications of Macromolecular Division. *News Bulletin* no. 2 had been distributed end 1977; it was agreed that the Secretary would edit a third *News Bulletin* in 1978. All Members and National Representatives were again requested to take necessary steps for ensuring publication in appropriate polymer journals.

Survey of Polymer Science and Engineering Programmes in Universities on a Worldwide Basis. A

decision on this project had to be postponed again since the Secretary had not yet received sufficient information about existing national publications.

7. Commissions IV.1 and IV.2. Prof. JENKINS reported that IDCNS had approved the document on nomenclature of polymer stereochemistry; this document would be published now as a provisional recommendation. At the forthcoming meeting of Commission IV.1 in Moscow (October 1978) main items for discussion would be: copolymers and nomenclature of physical properties.

Dr. BARRETT presented a written report on activities of Commission IV.2 [for further details see synopsis minutes of Commission Meeting (London, 30 August 1978) on pp. 200–201 of this issue].

8. Relations with ISO/TC 61. The Committee confirmed its decision made in 1976 not to comment any more on ISO Draft International Standards. More efficient means of collaboration between the Macromolecular Division and ISO were yet to be defined.

9. Next Meeting. Date and place of next meeting: 2 and 7 September 1979, Davos (Switzerland).

Present: V. A. KABANOV (President), C. H. BAMFORD (Vice-President), C. G. OVERBERGER (Past President), Z. JEDLINSKI, M. MANDEL, A. NAKAJIMA, R. C. SCHULZ, F. TÜDÖS, F. H. WINSLOW (Members); H. BENOIT, P. H. FINK-JENSEN, D. HEINZE, A. KEPES (Coopted Members); A. D. JENKINS (Chairman Commission IV.1), J. W. BARRETT (Chairman Commission IV.2), M. FARINA, J. KALAL, D. C. PEPPER, P. J. TEYSSIE (National Representatives), G. W. BECKER (Representative of IUPAP), A. J. DE VRIES (Secretary). In Part: G. SMETS (President of IUPAC).

COMMISSION ON POLYMER CHARACTERIZATION AND PROPERTIES (IV.2) Meeting at London (UK): 30 August 1978

1. Membership. The increase in activities of the Commission (see item 4) gives a case for increase in Titular Membership from six to eight. Associate Membership will be enlarged from three to six.

2. Minutes of Previous Meeting. Minutes of the meeting held in Warsaw on 14 August 1977 [see *IUPAC Inf. Bull.* (1978), No. 2, pp. 103–104] were confirmed.

3. Present Working Parties (WPs). Formal reports received from Working Parties I–III are presented hereunder:

WPI: Structure and Properties of Commercial Polymers. Two reports are scheduled to appear in *Pure Appl. Chem.* this year: (i) A collaborative study on the mechanical properties of rigid PVC – Effect of fillers; and (ii) A collaborative study of oriented polymers – Rubber modified polystyrene. Three reports are in their final state of preparation: (i) A collaborative report on the melt rheology of a thermoplastic elastomer of the A–B–A block copolymer type;

(ii) Development of residual shear stress in stress relaxation experiments on SBS block copolymers; and (iii) Collaborative studies of impact strength and its relevance to real mouldings. A report on the influence of PVC morphology on its rheology is being prepared.

New initiatives were taking place in the Molecular Theory subgroup including an experimental programme to determine the relation between linear viscoelastic behaviour of linear polymers and molecular weight, and molecular weight distribution.

WP II: Molecular Characterization of Commercial Polymers. Good progress had been made in the full characterization of polyethylene and polyvinylacetate samples and a report is scheduled to appear in *Pure Appl. Chem.* this year entitled 'Molecular characterization of polyethylene'. Methods used may be extended to include IR, ^{13}C -NMR and X-ray and neutron scattering. Other polymers under study by other Working Parties may also come under study and industrial opinion will be sought on the need for characterization work on synthetic rubbers.

WP III: Supported Polymer Films. Progress on the collaborative programme on 'Analysis of functional groups in amino resins' was good and a literature survey had been published in May 1978 in *Progress in Organic Coatings*.

A project on 'Adhesion' is under active survey and a survey of adhesion testing has been submitted for publication in *J. Colour Chem. Assoc.*

4. New Working Parties. Difficulties had arisen in the attempt to start work on thermodynamic properties of polymers, but it was agreed to invite Prof. HINRICHSSEN (University of Dortmund) to be chairman of a new Working Party on *Thermal Properties of Polymers*.

After considering a proposition from Prof. BAMFORD on the need for collaborative work on rate constants and other kinetic parameters it was agreed to set up a Working Party on *Kinetic Parameters for Free Radical Polymerization*.

Dr. CLARK (Durham University) presented a comprehensive review of possible activities concerned with the characterization and properties of polymer surfaces. The area was recognized as broad and important; Dr. CLARK was proposed as the chairman of a new Working Party on *Polymer Surfaces* and asked to set up as soon as possible an initial limited collaborative programme fully relevant to Working Parties I and III.

No new Working Party will be set up on the translocation of low molecular weight species in polymer systems, but it was agreed to support Dr. SCHUCH'S recommendation that diffusion and permeability of gases should be measured as required in Working Party I.

5. Publications. Although *PAC* was not considered always the best journal for polymer papers, the majority of Working Party reports had been published in it. There were still difficulties and it was agreed to ask Working Parties to suggest their preferred journal for publication of any new report with a supporting case if it was not *PAC*.

Present: J. W. BARRETT (Chairman), R. E. WETTON (Acting Secretary), P. H. FINK-JENSEN, TH. G. SCHOLTE

(Titular Members), H. BENOÎT, A. J. DE VRIES, C. G. OVERBERGER (Associate Members), C. H. BAMFORD, Z. JEDLIŃSKI, G. W. BECKER (Observers from Division Committee) and D. T. CLARK (Invited Contributor).

WORKING PARTY ON STRUCTURE AND PROPERTIES OF COMMERCIAL POLYMERS (of Commission IV.2)

(a) Meeting at Frankfurt (FRG): 18–19 May 1978

1. Orientation on Semi-crystalline Polymers (Polypropylene Films). DE VRIES reported on the results received so far, and intended to prepare a report on characterization by the end of 1978 for publication. Two other publications to follow might be concerned with processing of the films in the laboratory and with end-use properties. More work will be done in uniaxial extension and on impact resistance.

2. Impact Programme. TURNER would prepare a shorter version of his report on the impact resistance of polypropylene hexagonal boxes and plaques; possibility of a subprogramme on fracture mechanics was discussed. BUCKNALL accepted to coordinate this extension of the programme 'Study of Impact Strength Testing and its Relevance to Real Mouldings'; polypropylene MOPLEN T 30 S and propylene-ethylene copolymer 'Propathene' GWN 101 would be the chosen materials to prepare specimens.

Present: Dr. G. AJROLDI, Dr. C. B. BUCKNALL, Mr. J. M. CANN, Dr. M. E. CARREGA, Dr. J. CHAUFFOUREAUX, Dr. P. L. CLEGG, Dr. M. FLEISSNER, Dr. J. HEIJBOER, Dr. W. RETTING, Mr. D. E. THOMAS, Dr. S. TURNER, Dr. A. K. VAN DER VEGT, Dr. A. J. DE VRIES, Mr. F. WAALS. By Invitation: Dr. H. WILSKI.

(b) Meeting at Welwyn Garden City (UK): 3–4 July 1978

1. Membership. Prospective new members, who had written to the Chairman of their interest in participating in programmes presently going on, were considered acceptable if they feel able to comply with the rules of the Working Party.

2. Molecular Theory in Polymer Rheology. LODGE reported on the status of the work done by the subcommittee he is heading. Progress had been made toward the choice of a good constitutive equation describing the rheological behaviour of a polymer in molecular term; some experimental work should be undertaken to measure the normal stress over a period of time long enough to take account of the longest relaxation time. CANN would coordinate the experimental work on well characterized samples possibly provided by the Working Party on Characterization of Polymers.

3. Rheology of Block Copolymers. The updated final manuscript would be presented to the editor of *Pure and Applied Chemistry*.

4. PVC Morphology. COGSWELL reported on the result obtained so far: difference in the behaviour of the

emulsion PVC compared with bulk and suspension samples were still to be explained, more work should be done to observe the structure of the melt (sheared or not). COGSWELL would summarize the discussion and point to still standing question marks. A report would be prepared for the end of 1978.

5. *Polyethylene Film-blowing*. Information on the whole relaxation spectrum of the products is still incomplete; it would be checked if elasticity in shear correlates well with drawing behaviour. WINTER would ask in writing for experiments and prepare a draft of the final report before March 1979.

6. *New Rheology Programmes were suggested on melt rupture, rheology of filled polymer systems, effects of polymer degradation during measurements and processing, rheology of polyesters and polyamides, mechanism of film blowing failure, influence of rubber processing techniques on thermoplastics.*

Present: Dr. G. AJROLDI, Mr. S. T. E. ALDHOUSE, Mr. J. M. CANN, Dr. M. E. CARREGA, Dr. J. CHAUFFOUREAUX, Dr. P. L. CLEGG, Mr. F. N. COGSWELL, Mr. H. COSTER, Dr. M. FLEISSNER, Pr. A. S. LODGE, Dr. A. MICHEL, Dr. H. MUNSTEDT, Dr. A. PLOCHOCKI, Pr. D. SAUNDERS, Dr. A. J. DE VRIES, Dr. A. K. VANDER VEGT, Dr. J. L. S. WALES, Dr. H. H. WINTER, Dr. N. YAMOUCHI, Pr. J. MEISSNER, Dr. A. GHIJSELS.

COMMISSION ON ANALYTICAL REACTIONS AND REAGENTS (V.1)

Meeting at Dublin (Ireland): 26 August 1978

1. *Previous Meeting*. The minutes of the meeting held in Warsaw on 13–15 August 1977 have been published in *IUPAC Inf. Bull.* (1978), No. 2, pp. 106–107.

2. *Progress Report on Projects*. (i) KAPEL reported that the report on *determination of amines* has been translated into English and copies will be sent to members in September 1978 for possible comments prior to acceptance. (ii) The project on *compleximetric indicators* was discussed and some small improvements made. Agreement was also made on the terms used in the later parts of this project. (iii) The project on *acid–base indicators* in nonaqueous solvents was discussed critically pointing out that there is still need for inter-laboratory experiments and the aims of project should be restricted to analytical criteria of indicators. Similar conclusions were made concerning the projects: *determination of polyphenols*, and *determination of traces of metals in organic compounds*. (iv) The report prepared by HULANICKI on the importance of the definition of *selectivity* was discussed. It was agreed that the report, with some improvements based on the discussions, will be circulated among members for further comment in 1978. (v) The report on *recommendations concerning the presentation of papers based on ion exchange methods* was discussed and accepted with small improvements. The improved draft will be sent to Commission V.3 for discussion at the meeting in London in 1978. (vi) The project

amplification was also discussed in detail. The report presented by STEPHEN was accepted in principle, but the draft in an improved form will be sent to members for comments before final acceptance in 1978.

3. *Cooperation with Other Organizations*. STEPHEN gave report on the ISO meeting held in London in 1978. After discussion it was clearly concluded that there is an important need for cooperation between IUPAC and ISO concerning the analytical projects of ISO. Very similar conclusions were made concerning the cooperation between IUPAC and REMCO. The Commission agreed to wait for REMCO's reply from the meeting in Geneva (12–15 September 1978) on our earlier comments.

4. *Other Business*. Finally the profiles of the future projects were discussed, and the meeting was closed by the Chairman. The next meeting will be held in Davos in 1978 during the IUPAC General Assembly.

Present: A. HULANICKI (Chairman), J. INCZEDY (Secretary), C. DEN BOEF, D. T. BURNS, W. I. STEPHEN, M. KAPEL (Members), R. BELCHER (ex-Chairman).

SUBCOMMITTEE ON SOLUBILITY DATA (of Commission V.6)

Meeting at Atlanta (USA): 27–29 June 1978

1. *Minutes of Previous Meeting*. The minutes of the meeting held at Warsaw (Poland) on 13 and 16 August 1977 [see *Inf. Bull.* (1978), No. 2, pp. 111–112] were adopted.

2. *Report of the Chairman*. The Chairman reported on his activities of the past year with particular emphasis on recruitment and on the relationship of the subcommittee to IUPAC.

Recruitment has now shifted to the three systems coordinators of CLEVER for gas–liquid systems, BARTON for liquid–liquid systems and SALOMON for the solid–liquid systems, and to GEVANTMAN for other systems. The recruitment of experts from a wide range of nations is an immediate goal. GEVANTMAN and KERTES reported that there is some progress on the recruitment of experts in the fields of molten slags and glasses and of molten salts. Several systems are being made subsections of the solid–liquid systems. They are pharmaceutical systems (YALKOWSKY), and polymer systems (SEYMOUR). The recruitment of experts in the fields of metallurgical systems and geological systems will be continued in the next year.

The Chairman's efforts to increase the visibility of the Solubility Data Project within IUPAC were outlined. These efforts should aid in the recruitment of experts for the project and aid in solving some of the financial problems of the project.

3. Progress Reports

(a) *Gas–liquid systems*. Editors and contributors have been assigned for a tentative publication schedule of twelve volumes by 1981. The first volume 'The Solubility of Helium and Neon' is complete and has

been turned over to the publisher, Pergamon Press. The second volume on 'The Solubility of Krypton, Xenon and Radon' should be complete in September 1978 and the third volume 'The Solubility of Argon' should be complete by December 1978. The group is seeking other experts as editors and contributors especially from Japan and Canada for other projected volumes.

(b) *Liquid-liquid systems*. The first volume on the halogenated benzenes + water will be ready in December 1979. Four other volumes on monofunctional aliphatic alcohols, hydrocarbons of C₅ and up, halogenated aliphatic hydrocarbons of C₁ to C₆, and the remainder of the non-halogenated organics are projected for completion at six month intervals through December 1981. BARTON will be on leave from April 1979 to November 1979 at Oxford where he will help coordinate work between the SDP and Pergamon Press.

(c) *Solid-liquid systems*. Thirteen volumes are scheduled for completion through June 1980. A volume on the silver pseudo-halides will be complete in November 1978. Seven volumes on alkaline earth sulfates, alkali metal halides in amides, silver halides in water, alkali metal chloride binary systems, simple mono- and disaccharides in aqueous solutions, oxides, and hydroxides of group IA and IIA metals in water, and metals in mercury are all scheduled for July 1979 completion. The introductory text for the solid-liquid systems volumes will be prepared by COHEN-ADAD; LORIMER and SALOMON.

4. *Extension of Activities*. Working groups were set up to report at the next meeting on (i) Preparation of guidelines for publishing solubility data in the primary literature (LORIMER, DAVIS), (ii) preparation of guidelines for the correlation and estimation of solubility data (HOWERY, ROSENSTEIN), (iii) use of machine readable data sheets (deferred), (iv) establishment of solubility data and research centers (KERTES), and (v) organization of special symposiums on solubility phenomena (SALOMON, COHEN-ADAD).

5. *Publicity*. KERTES, assisted by MIRANDA, will prepare an initial draft of the special announcement to be used by Pergamon Press in publicizing the published volumes of the Solubility Data Project. Members of the Solubility Data Project will seek to distribute literature on the Project and to publicize the Project at meetings and conferences they attend.

6. *Next Meeting*. The next meeting of the subcommittee on Solubility will be held 3-7 September 1979 at Davos, Switzerland. There will be two joint meetings scheduled, one with the parent Commission on Equilibrium Data and one with the Commission on Electroanalytical Chemistry and the Commission on Equilibrium Data.

Detailed minutes of the Atlanta meeting, along with other documents on the project, are available on request.

Present: A. S. KERTES (Chairman), A. F. M. BARTON, R. BATTINO, H. L. CLEVER, A. F. CLIFFORD, W. GERRARD, L. H. GEVANTMAN, M. SALOMON, C. L. YOUNG (Members); J. E. BAUMAN, R. COHEN-ADAD, D. HOWERY, F. J. JOHNSTON, K. L. LOENING, P. L. LONG, J. W. LORIMER, A.

MACZYNSKI, R. A. ROSENSTEIN, R. B. SEYMOUR, A. SZAFRANSKI, E. M. WOOLEY, S. YALKOWSKY (Observers); R. N. MIRANDA (USA) (Representative of Pergamon Press).

APPLIED CHEMISTRY DIVISION COMMITTEE

Meeting at Oxford (UK): 16-17 June 1978

1. *Minutes of Previous Meeting*. The minutes of the meetings held in Warsaw 12, 16 and 17 August 1977 [see *Inf. Bull.* (1978), No. 2, pp. 114-115] were accepted.

2. *Organization of the Division*. The Division Committee recognized the resolution of the Council in Warsaw [*IUPAC Inf. Bull.* (1978), No. 1, p. 31] that the Commissions on Food Properties and on Food Contaminants be combined to form a Commission on Food Chemistry in 1979. The importance of having an extended number of Associate Members and National Representatives in the new Food Commission was stressed and it was suggested that the Commission could advantageously form Working Groups, as is the practice of the Commission on Oils, Fats and Derivatives. After discussing at length aspects and implications of combining Commissions, the Division Committee requested the Commissions on Terminal Pesticide Residues and on Pesticide Residue Analysis to consider a reorganization similar to that of the Food Commissions.

3. *Subcommittee on New Projects*. Dr. LANGLYKKE reported on the meeting of the subcommittee on New Projects held on 14-15 June in Oxford, at which a report to the Division President had been elaborated. The subcommittee found about half of the work of the Union was devoted to applied aspects of chemistry and recommended that the programme of the Union become more heavily weighted in favor of applied subjects. On the other hand, the subcommittee could not, in general, recommend the transfer of specific projects, although it recognized cooperative arrangements were possible beyond those which have already been established. The subcommittee was unable to make definite proposals for new programmes or projects; it therefore proposed to conduct a broader survey to develop a list of suggestions for new programmes, which the Division President might consider and transmit with his recommendations to the Bureau. A report with the results of this survey, would be available on 1 January 1979.

4. *Divisional Programme*. In accordance with the decision made in Warsaw, it was agreed that, for the evaluation of the programmes of the Division, the Corresponding Members of the Commissions and the Chairmen concerned should make a critical review of the Commission projects and that a single report from the individual reviews should be prepared. Referring to the lists of ACD Commission projects circulated to the participants, the Committee agreed that fuller information should be available, including the present status of the projects, and the date when the project

was initiated. It was also agreed that the project proposal forms, which included more detailed information than project lists, should be circulated to all Members of the Division Committee.

5. *Guidelines.* The guidelines for the Applied Chemistry Division, adopted in Warsaw, would be sent to the Bureau for information and circulated to the whole membership of the Division. The guidelines project would be deleted from the project list but would be kept under review.

6. *Divisional Liaison.* Dr. EGAN stated that he had previously acted as the Coordinator of the divisional project on Ocean Chemistry and that it had been agreed that liaison with SCOR should be transferred to the Commission on Water Quality. Dr. VOS was appointed joint Coordinator on the project on Harmonization of Collaborative Analytical Studies, with the present Coordinator Dr. EGAN. Dr. KOJIMA, the present liaison member for the Section on Clinical Chemistry, was appointed as the liaison member for the Analytical Chemistry Division, along with Dr. EGAN. Dr. LANGLYKKE was appointed as the Coordinator for Diversification of the ACD Programme and as the liaison member for the Committee on Chemistry and Industry. Dr. EGAN would continue as the liaison member to CHEMRAWN until 1979.

7. *Reports from Commissions.* The Corresponding Members or representatives of the Commissions reported briefly the highlights of the programmes of the Commissions concerned. Mr. LUXON reported that the Commission on the Atmospheric Environment had considered extending its activity from reviewing the levels of compounds in air to proposing appropriate values of airborne contaminants; since this would involve considerations other than chemistry, however, it was felt that such a change could not be recommended.

8. *Membership.* The 1979 election of the Division Committee will be conducted by postal ballot, if necessary, as at the 1977 election. Since several Commission Chairmen would retire at the General Assembly it was decided to remind the current Chairmen that they should make proper provision for the continuation of Chairmanship of their Commissions. It was agreed to invite the Committee on Chemistry and Industry to offer nominations for possible Co-opted Members for consideration by the Division President before the next Division Committee meeting.

9. *Interdivisional Committee on Nomenclature and Symbols.* It was agreed that, Drs. EGAN and EPSTEIN should discuss the future representation of the Division on IDCNS and make recommendations to the Division President. Dr. EGAN said that he had compiled a list of sources for trivial names as requested in Warsaw.

10. *Coordinating Committee for Analytical Methods for CEE.* Dr. EGAN reported on the activities of the Coordinating Committee for Analytical Methods for

CEE. It was desirable that an input should be made by the ACD in the future. However, the role of the Union was currently under reconsideration by the President and it was unlikely that the Coordinating Committee would meet in 1979.

11. *SCOPE.* Dr. EGAN informed the meeting that he had circulated a report on SCOPE Executive Committee meeting in May 1978 to the Division Presidents and the ACD Commission Chairmen and asked for comments and suggestions for possible involvement of IUPAC.

12. *Relation with International Organizations.* It was agreed to invite observers from WHO and FAO to attend the next General Assembly meeting. It was also important to invite an observer from EEC. The Division Committee also discussed cooperation with ISO, draft standards of which were circulated within the Division for advice and comment, and relations with ICC, COWAR and IUFoST.

13. *Harmonization of Collaborative Studies.* Dr. EGAN said that a report on the symposium on Harmonization of Collaborative Analytical Studies, London 9–10 March 1978, would be published in *IUPAC Information Bulletin* [see *Inf. Bull.* (1978), No. 2, pp. 132–137]. Whilst no formal decisions were taken at the symposium it was agreed that a small joint Working Party would be useful to progress matters discussed. The Presidents of the Analytical Chemistry Division, the Section on Clinical Chemistry and the ACD will meet in Brussels in August to discuss the subject matter.

14. *CHEMRAWN.* Dr. EGAN reported that the CHEMRAWN Planning Committee would discuss the arrangement of a Joint IUPAC/IUFoST International CHEMRAWN symposium on contribution of chemistry to food supplies, possibly in 1980 or 1981 following the first CHEMRAWN symposium in Toronto in July 1978. If the symposium is agreed it could heavily involve the Food Commission and Pesticide Commissions of the Division.

15. *General Assembly.* The Division Committee discussed suggestions which had been made for more compact General Assemblies in the future. The Committee thought it desirable that at least some members of the Commissions should attend the Division Committee meeting during a General Assembly.

16. *Next Meeting.* The next meeting of the Division Committee will be held during the General Assembly in Davos, 2–7 September 1979.

Present: Prof. H. SUOMALAINEN (President), Dr. A. LANGLYKKE (Vice-President), Dr. H. EGAN (Past President), Dr. H. FREHSE (in part attendance), Dr. K. KOJIMA, Dr. H. J. VOS (Division Committee) and by invitation Dr. L. COLES (representing the Food Contaminants Commission), Mr. S. LUXON (representing the Atmospheric Environment Commission, in part attendance), Mr. J. OKSANEN (assisting Prof. SUOMALAINEN).

**APPLIED CHEMISTRY DIVISION:
SUBCOMMITTEE ON NEW PROJECTS**

Meeting at Oxford (UK): 14–15 June 1978

The Subcommittee on New Projects appointed in Warsaw during the IUPAC General Assembly was requested to report to the President of the ACD on: (i) IUPAC projects of applied interest; (ii) projects which might be candidates for transfer or joint study; (iii) neglected areas of industrial and environmental interest appropriate for IUPAC study. The results of the subcommittee's study assembled at the meeting are summarized below:

A. Applied Programs and Projects

The programs of the Union (as listed in the IUPAC Project Programmes, May 1977) which appear to be of applied interest in addition to those of the ACD are:

(i) *CHEMRAWN Planning Committee*. The CHEMRAWN program is completely applied in its goals.

(ii) *Section on Clinical Chemistry*. The program of the Section is designed to support the application of the science of chemistry to use in the clinical laboratory.

(iii) *Subcommittee on Plasma Chemistry*. Because of the important potential applications of developments in plasma chemistry, the program of this subcommittee might be classified as applied in nature.

(iv) *Commission on Photochemistry* (III.3). The theme of this Commission's program certainly has important applied aspects, e.g. in the field of air quality.

(v) *Commission on Medicinal Chemistry* (III.4). The program of this Commission is on the whole applied since its basic objective is support for the application of chemistry to the discovery and qualification of chemical compounds with utility as drugs.

(vi) *Commission on Microchemical Techniques and Trace Analysis* (V. 2). This program appears to be applied since the underlying concepts in trace analysis imply application to certain material purposes.

(vii) *Programs of Specific Units Within ACD*: (a) Commissions on Food Properties and Food Contaminants (VI. 1, VI. 2); (b) Commission on Fermentation (VI. 3); (c) Commission on Oils, Fats, and Derivatives (VI. 4); (d) Commission on the Atmospheric Environment (VI. 5); (e) Commissions on Terminal Pesticide Residues, and Pesticide Residue Analysis (VI.6, VI.7); (f) Commission on Water Quality (VI.8); (g) Commission on Reclamation of Solid Waste (VI.9).

Examination of the May 1977 listings has also revealed a number of other discrete projects of clearly applied nature which are not detailed here. Our analysis suggests that 40–60 percent of the work of the Union is devoted to applied aspects of chemistry. Furthermore, as the science matures it will be more widely employed in the service of man and the program of the Union must become more extensive and more heavily weighted in favor of applied subject matter.

B. Prospects for Transfer or Joint Study of Applied Programs and Projects

The programs and projects listed above were originally developed by particular IUPAC units on

some rational basis. If there are suggestions now to transfer programs or projects from one organization unit to another, such transfers must be based upon reasoning that has changed, or upon new interests that have developed since the original assignments were made. The general response to suggestions for transfer of programs between Divisions has been, on the whole, negative.

Many, if not most of the Commissions of the Union, have projects on the teaching of certain limited or highly specialized areas of chemistry identified with the interests of particular working units. Better progress might be made in the teaching of chemistry and its specialized subject matter if these projects were more closely coordinated by the Committee on Teaching of Chemistry (CTC).

It does appear that cooperative arrangements are possible beyond those which have already been established. Useful cooperation might be enhanced by concerted efforts of the responsible leaders within IUPAC such as the Division Presidents, Commission Chairman, and Project Leaders or Coordinators.

C. New Projects

Before new projects are proposed by the subcommittee it must have full input from all IUPAC bodies and perhaps, also, from organizations and individuals outside IUPAC. In order to obtain broad IUPAC involvement a survey is planned in order to develop and to document important new programs. Following are a proposed set of criteria for new projects proposed by this subcommittee.

(i) Projects of IUPAC should meet common scientific objectives of trade and commerce. They should, as well, serve the public welfare and should be of importance internationally.

(ii) The results of such programs should be generally useful on an international scale to members of industrial groups, to governmental agencies, to academic institutions and to the general public.

(iii) IUPAC should not compete with industry and should not pursue programs in which proprietary interests may be prejudiced.

(iv) Projects undertaken by IUPAC should, in general, depend upon IUPAC's authoritative position in the definition of standards, nomenclature, etc., to the benefit of science and its application.

(v) Special care should be given to minimize duplication of effort.

(vi) No project should be undertaken or extended unless the description includes a termination date, normally not more than two years beyond the approved date.

Since new (and current) projects may call for more support than the Union can provide, individual program groups should be allowed and, indeed, encouraged to seek outside financial support. The ready availability of such support would, to a degree, justify the program and confirm its importance. It is obvious, of course, that the Union must not become the tool of special interest and should preserve balance in the overall program. Therefore, the solicitation of

funds or other assistance for elements of the program should be centralized and conducted under close surveillance by the responsible officials and governing bodies of the Union.

Present: A. F. LANGLYKKE (Chairman), W. SPINDEL (Secretary), H. EGAN, H. FREHSE.

COMMISSION ON FOOD PROPERTIES (VI. 1)

Meeting at Budapest (Hungary): 17–19 August 1978

1. Minutes of the meeting held in Warsaw on 13–16 August 1977 have been published in *IUPAC Inf. Bull.* (1978), No. 2, pp. 117–118.

2. Based on a series of collaborative studies on trace volatile nitrosamine analysis of foods in cooperation with IUPAC, the International Agency for Research on Cancer (IARC) has published a manual of methods (*IARC Scientific Publication, No. 18*, 1978). A survey of available analytical methods for non-volatile nitrosamines in foods is in process of publication by IUPAC in *Pure Appl. Chem.* Also a collaborative study of a method for three nitrosoamino-acids in food is planned for publication.

3. An IUPAC–IARC work conference on nitrite analysis of foods is planned in conjunction with an IARC symposium on nitrosamines in October 1979 at Budapest.

4. The Association of Official Analytical Chemists (AOAC) in cooperation with IUPAC expects to complete a collaborative study of a method for simultaneous determination of a number of antioxidants in foods during 1978.

5. The IUPAC-recommended screening methods for polycyclic aromatic hydrocarbons in foods (in process of publication) is adaptable to determination of identified *N*-containing polycyclic aromatic carcinogens in food and a collaborative study is planned.

6. The analytical project on ‘fiber’ in foods has not been initiated in the absence of a precise chemical definition of the term.

7. Continuation is recommended of projects on sulfa drug residues in the edible products from treated livestock and on food colorants and their impurities.

8. A survey of analytical methods available for the estimation of artificial sweeteners in food has been published [*Pure Appl. Chem.* **50** (1978), 243–54].

COMMISSION ON FOOD CONTAMINANTS (VI.2)

Meeting at Budapest (Hungary): 17–19 August 1978

1. *Minutes of the Previous Meeting.* The minutes of the previous meeting held in Warsaw, 13–15 August 1977 [see *IUPAC Inf. Bull.* (1978), No. 2, pp. 118–119] were approved.

2. *Commission Activities: 1977–78.* Dr. KOJIMA reported that his account of the activities of the Commission since the Warsaw meeting (this issue, p. 191) had been sent by the President of Applied Chemistry Division in July 1978 to the Secretariat for submission at IUPAC Bureau Meeting (Brussels: 1–2 September 1978).

3. Reports on Projects

The status of each project was reported and Dr. COLES emphasized that in future a firm date of completion should be stated for each project.

(i) Prof. BILLEK reported that the analysis of vinyl chloride and vinylidene chloride in packaging materials, edible fats and dairy products had been continued. Vinyl chloride concentrations of less than 1 mg/kg in packaging materials are technically feasible and as a result prepacked food would meet all legal requirements for limits of vinyl chloride. He agreed to produce a summarizing report to be published by IUPAC. He informed that study on the migration of acrylonitrile from packaging materials had started.

(ii) Prof. KROGH agreed to arrange for the study when Dr. STEYN succeeds to prepare a method which will eventually be studied collaboratively as to establish a standard IUPAC method on multi-mycotoxin analysis.

(iii) Dr. COLES reported that a method for the determination of lead and cadmium would soon be circulated for comment and early publication.

(iv) Dr. COLES reported that the recommended method for the determination of copper in foodstuffs had been prepared for publication.

(v) Dr. COLES submitted a method for the determination of selenium in food and it was agreed that a collaborative study would be commenced as soon as possible.

(vi) Dr. LITTLEHAILES submitted a final draft on ‘Proposed Guidelines for Testing Single Cell Protein Destined as Protein Source for Animal Feed (Part II)’, which has been prepared by a working party jointly with the Commission on Fermentation and would be published as an IUPAC Technical Report.

(vii) Dr. KOJIMA reported that a study on aflatoxin formation during shipment of maize was planned in Japan.

(viii) Dr. CAMPBELL informed the Commission that an AOAC handbook on sampling plans for mycotoxin analysis would be completed soon.

(ix) Dr. SCHULLER distributed a method for the ‘Rapid Determination of Aflatoxin M₁ in Dairy Products’ and it was agreed that a collaborative study would be arranged.

(x) Dr. COLES reported that a review article on ‘commonly used methods of analysis for tin in foods’ had been presented at the second FAO/WHO Consultation on Methods of Sampling and Analysis of Contaminants in Food (Rome, Italy: 27 February–3 March 1978) by Dr. HORWITZ (AOAC).

(xi) Dr. KROGH reported the progress of his study of chemical procedures for the analysis of saxitoxin in shellfish.

(xii) Dr. JEMMALI agreed to talk with FAO on the possibility of cooperation to publish a compilation of IUPAC recommended methods for determination of mycotoxins.

(xiii) Dr. STEYN reported that he had obtained analytical pure samples of 14 mycotoxins and was looking for some others; it was agreed to publish their physical data, when completed, as specifications for mycotoxin analytical standards.

(xiv) Dr. JEMMALI reported on the arrangements for a collaborative study of a method for determination of aflatoxin residues in food of animal origin.

(xv) Prof. KROGH announced the arrangements for the 4th International Symposium on Mycotoxins and Phycotoxins to be held in Lausanne, Switzerland, 29–31 August 1979.

(xvi) Dr. JEMMALI agreed to prepare 'guidelines for the detoxification procedures of mycotoxin-contaminated foodstuffs' for publication by IUPAC.

(xvii) Dr. COLES reported that a method for the determination of mercury in food was in the course of publication.

(xviii) Dr. CAMPBELL requested data, information and views on recycled animal waste for submission to the FDA (USA) and a Federal Register document was distributed.

(xix) Dr. T. KATO (Commission on Food Properties) distributed 'a survey of analytical methods available for the estimation of fluorine in food and biological materials', and 'a survey of bromine residues in foodstuffs'.

(xx) Dr. CAMPBELL reported progress on the determination of mycotoxins by HPLC.

4. Dr. KOJIMA informed of the decision to combine the two food commissions (VI. 1 & VI. 2) into a single Commission on Food Chemistry in 1979 and that three working groups would be formed to deal with mycotoxins, metals, and seafood biotoxins.

5. Dr. JEMMALI reported that Invited Lectures from Third IUPAC Symposium on Mycotoxins in Foodstuffs (Paris, September 1976) had been published in *Pure Appl. Chem.*, **49** (1977), pp. 1703–1778, and the rest of the proceedings in *Ann. Nutr. Alim.* **31** (1978), pp. 403–410; in *Annales de l'Inst. National de la Recherche Agronomique*; and in a special issue of *Ann. Nutr. Alimentation*.

6. Dr. KOJIMA outlined the cooperation with other international organizations, such as FAO, WHO, UNEP, EEC, IUFOST, ISO, ICC, and the Codex Alimentarius Committee.

7. Dr. KOJIMA suggested that a subject for future studies should be the problem of how to distinguish between irradiated and non-irradiated food.

8. *Next Meeting.* The 1979 meeting of the Commission would be held between 3–6 September in Davos, Switzerland.

Present: Dr. K. KOJIMA (Chairman), Dr. L. E. COLES (Secretary), Dr. A. D. CAMPBELL; Dr. M. JEMMALI, Prof. P. KROGH, Mr. M. V. TRACEY (Titular Members); Prof. G. BILLEK, Dr. W. KRÖNERT, Dr. J. D. LITTLEHAILES (Associate Members); Prof. T. JUSZKIEWICZ (National Representative); Dr. I. VARSANYI, Prof. D. R. WILLIAMS (Observers).

COMMISSION ON FERMENTATION (VI. 3)

Meeting at Munich (FRG): 2–3 September 1978

1. At the meeting of the Fermentation Commission two sets of guidelines were completed and approved by the Commission for publication. These were: (i) Proposed guide for testing of single cell protein destined as a protein source for animal feed (II), and (ii) Recommended list of terms, symbols and units. The project in the exchanging of newsletters had been completed.

2. Progress in the preparations for the 6th International Fermentation Symposium to be held in London (Ontario) was discussed, and the Commission recommended that it be fully negotiated at the Specialized Symposium on the Industrial Use of Yeasts.

3. An invitation from the Indian National Academy of Sciences to hold the 7th International Fermentation Symposium in India in 1984 had been received and the Commission voted to recommend to the members of the 6th International Fermentation Symposium that the invitation be accepted.

4. Several new projects were discussed and position papers will be prepared for the General Assembly Meeting at Davos in 1979.

5. A detailed plan for the project on 'Microbial Technology in the Provision of Energy and Chemicals from Renewable Resources' was presented and the first draft of the report of the subcommittee will be prepared for 1979.

Present: A. E. HUMPHREY (Chairman), H. DELLWEG (Vice Chairman), R. C. RIGHELATO (Secretary), T. K. GHOSE (Titular Members); H. T. BLACHERE, A. FIECHTER, J. C. HOOGERHEIDE, F. PARISI, J. E. ZAGIC (Associate Members); M. LINKO, O. ILNICKA, H. WUTZEL (National Representatives).

COMMISSION ON OILS, FATS AND DERIVATIVES (VI. 4)

Meeting at Brussels (Belgium): 29 August–1 Sept. 1978

1. *Minutes of Previous Meeting.* The 'Procès-Verbal des réunions de Varsovie – 1977', based on meetings

held in Warsaw on 13–16 August 1977, and distributed to the members in October 1977 by IUPAC Secretariat was adopted [for synopsis minutes see *IUPAC Inf. Bull.* (1978), No. 2, pp. 120–121].

2. *Membership.* Members stood in silence to the memory of Ir. C. CAROLA who had died on 26 December 1977. The following have resigned their functions within the Commission: Prof. MARTINEZ MORENO, in June; and Mr. PETERSEN, at the end of the meeting.

3. *Chairman's Report.* After evoking events which affected members of the Commission, the Chairman explained the relations of the Commission with the Applied Chemistry Division, with other Commissions and with International Organizations. He pointed out the difficulties encountered by financial restrictions and those concerning the membership. Looking to the future he suggested that the Commission take up studies on new topics and have the opportunity to welcome new members coming from countries not yet represented.

4. *Reports of Working Groups (WGs).* Results obtained by the Working Groups (WGs) were discussed and it was agreed that the activities of the following WGs were continued (names of Chairmen in parenthesis):

WG 6: Determination of the oil content in oil seeds by NMR techniques (Dr. J. P. WOLFF)

WG 11: Determination of total fat in margarine (Prof. M. NAUDET)

WG 14: Revision of method II.D.5. 'Determination of unsaponifiable' matter (Prof. M. NAUDET)

WG 15: Revision of method II.D.1. 'Determination of the acid value' (Drs. H. VOS)

The relevant methods will be published.

5. *Work Programmes of WGs.* The activities of the following WGs are to be maintained:

WG 2: Determination of total oxidized fatty acids by TLC and densitometry (Prof. M. NAUDET). A first method will be published.

WG 3: Determination of tocopherols (free and esterified) in oils, fats, margarine, . . . (Drs. P. HENDRIKSE)

WG 4: Determination of chlorinated pesticides in oils, fats (specially in lanoline) (Prof. E. DELVAUX). A first method will be published.

WG 5: Determination of the content of *cis-cis*-linoleic acid in oils, fats, margarine, . . . (Dr. Ö. LEVIN)

WG 7: Report on changes taking place in oils and fats during deep fat frying (Prof. H. WESSELS)

WG 8: Identification and determination of emulsifiers (derived from fatty materials) in oils, fats, fat products, cosmetics, . . . (Dr. H. BRÜSCHWEILER)

WG 9: Publication of methods (Dr. A. HAUTFENNE)

WG 12: Determination of plastic polymers in oils and fats (Drs. J. VAN DER WEEL)

WG 13: Determination of undesirable plastic-based contaminants (other than polyethylene) in oils and fats (Dr. Ö. LEVIN)

WG 16: Methods of analysis for glycerines (Ir. MØLLER)

WG 17: Methods of analysis for alkaline soaps (Dr. H. BRÜSCHWEILER)

WG 18: Determination of erucic acid (Prof. H. WESSELS)

6. *New WGs.* The creation of the following WGs was adopted:

WG 19: Identification and determination of industrial lecithin constituents (Dr. Ö. LEVIN)

WG 20: Determination of solid content of fats by NMR techniques (Prof. M. NAUDET)

WG 21: Determination of polycyclic aromatic hydrocarbons content in fats (Dr. D. FIRESTONE).

7. *Publications.* The 6th Edition of *Standard Methods for the Analysis of Oils, Fats and Derivatives* and its French translation are in the press. The 4th Supplement to the 5th Edition has been published by Pergamon Press, Oxford.

8. *Next Meeting.* The next meeting will be held in Davos (Switzerland) during the 30th IUPAC General Assembly.

Present: Prof. C. PAQUOT (Chairman), Prof. E. DELVAUX (Vice-Chairman), Dr. A. HAUTFENNE (Secretary), Dr. H. BRÜSCHWEILER, Dr. D. FIRESTONE, Dr. Ö. LEVIN, Dr. J. POKORNY, Dr. H. WENDT (Titular Members); Dr. J. BEARE ROGERS, Mr. A. PETERSEN, Drs. J. VAN DER WEEL, Prof. H. WESSELS, Dr. J. P. WOLFF (Associated Members); Prof. M. CHAKRABARTY, Dr. A. DIEFFENBACHER, Dr. GRACIAN TOUS, Drs. P. HENDRIKSE, Miss B. JACOBSBERG, Dr. A. KARABATUR, Dr. E. KURUCZ, Mr. B. MCGWYNNE, Ir. A. MØLLER, Prof. M. NAUDET, Dr. R. OHLSON, Dr. M. TEUPEL, Dr. K. WILLIAMS, Dr. G. ZWERENZ (National Representatives); Dr. N. EMBREE, Mr. ENGELRUD, Mrs. E. LEWKOWITSCH, Drs. H. VOS (Collaborative Members); Prof. H. CHAVERON, Mrs. S. HAARSCHER, Dr. G. HÖLMER, Dr. S. KUBACKI, Mr. C. MOXHET, Dr. R. PLAYER, Dr. W. POCKLINGTON, Dr. A. WALKING, Prof. S. WATANABE, Ir. R. ZWART (Observers).

COMMISSION ON PESTICIDE RESIDUE ANALYSIS (VI. 7)

Meeting at Deidesheim (FRG): 17–21 July 1978

1. *Minutes of Previous Meeting.* The minutes of the 11th meeting held in Warsaw, Poland 13–16 August 1977 [see *Inf. Bull.* (1978), No. 2, p. 124] were adopted without comments.

2. *Publications.* Past difficulties have now been resolved with the publication of synopsis minutes in the *Information Bulletin* and selected papers in *Pure and Applied Chemistry*. A total of 8 papers from 1976–77 meetings had been accepted by the Publications Committee.

3. *Liaison with other Organizations.* Liaison with other international groups continues through representation of members; CCPR (Dr. GREVE), CIPAC (Dr. BATORA), COMECON (Dr. BATORA). Dr. TURTLE (FAO) and Mr. HUDSON (EEC) attended by invitation. Discussion concentrated on how the

Commission might be of greater help to FAO, in particular, the FAO/WHO Joint Meeting on Pesticide Residues (JMPR). Liaison with the Commission on Oils and fats (VI. 4), Food Additives (VI. 1) and Food Contaminants (VI.2) continues through Joint Meetings and exchange of minutes.

4. *Objectives of the Commission.* The Commission discussed and endorsed the criteria for projects in the report of the subcommittee on New Projects. It was agreed that they should be rigorously applied when projects were examined each year.

5. *Amalgamation and Membership.* The proposal for amalgamation with the Terminal Residues Commission (VI.6) was again discussed with particular attention to the best format for proceeding. It was concluded that the formation of subcommittees would negate the main advantage of amalgamation and the Commission recommended the formation of project working groups. In 1979 the RA and TR Commissions would meet as a single Commission.

6. *Projects.* The existing projects were discussed in the light of amalgamation. The Commission agreed to recommend the publication of three project reports (i) Status Report on Clean-up Procedures (Prof. H. P. THIER) and (ii) Status Report on Determination Procedures (Mr. I. S. TAYLOR) and (iii) Detection and Determination Limits in Residues Analysis (Dr. S. GORBACH). Other projects would continue with the combination of contributions into definitive papers. Current assignments are: I. Characterization and Determination of Pesticide Residues (Dr. H. FREHSE and Dr. P. GREVE). II. Reliability of Residues Data (Mr. J. A. R. BATES, Dr. S. GORBACH, Mr. I. S. TAYLOR). III. Simple Methods of Analysis (Dr. BATORA, Dr. KLISENKO, Dr. VITOROVIC). IV. Confirmatory Techniques (Dr. GREVE). V. Methodology Progress Reports (Mr. I. S. TAYLOR, Prof. H. P. THIER) VI. Compound Reviews (fumigants), (Mr. S. B. HEUSER). Two other papers were discussed, 'Good Analytical Practice in Residues Analysis' (Mr. G. M. TELLING of Unilever Ltd.) and 'The Evaluation of Pesticide Residues in Food: Procedures and Problems in Setting Maximum Residues Limits' (J. A. R. BATES). Both were expected to be published outside IUPAC.

7. *Next Meeting.* The 1979 meeting is planned during the General Assembly at Davos, Switzerland, 2–10 September 1979.

Present: Mr. M. J. EDWARDS (Chairman), Mr. J. A. R. BATES (Secretary), Dr. V. BATORA (also representing CIPAC), Dr. P. A. GREVE (also representing CCPR); Dr. S. GORBACH (Titular Members), Mr. S. G. HEUSER, Mr. I. S. TAYLOR, Prof. H. P. THIER, Dr. S. LJ. VITOROVIC (Associate Members). The following attended by invitation, Dr. E. E. TURTLE, FAO, Mr. G. HUDSON, EEC, DR. R. J. WHITEOAK (Observer under the Wates–IUPAC Bursary Scheme).

COMMISSION ON WATER QUALITY (VI. 8)

Meeting at Frankfurt/Main (FRG): 11–12 April 1978

1. *Previous Meeting and Membership.* Minutes of the previous meeting (Warsaw: 13–14 August 1977) had been published in *IUPAC Inf. Bull.* (1978), No. 2, pp. 126–127. The Commission now has its full number of members, as published in *Membership Lists of IUPAC Bodies 1977–1979* (Pergamon Press, Oxford, 1978).

2. *Policy on New Projects.* It was suggested that projects should: (i) have an effect also outside IUPAC; (ii) not be limited by time; (iii) not be only for information but rather be proposals.

3. *Projects of the Commission*

(i) The Commission will organize the 3rd International Congress on Industrial Waste Water and Wastes in Stockholm during 7–9 February 1980. The topics to be covered will include: (a) Identification, significance and fate of specific pollutants in the aquatic environment. (b) Present state and future trends of treating waste water and wastes. (c) Handling and disposal of solid and liquid wastes. (d) Special treatment of waste water and wastes from different kinds of industries. (e) Monitoring. Prof. WAGNER will be the Chairman of Programme Committee. Dr. FREYSCHUSS; Chairman of Organizing Committee, and Mr. GÖRANSSON, Secretary of the Congress.

(ii) *Microbiological Aspects of Effluent Treatment* (Coordinator: Prof. GRAU). This subject is a discussion point at a workshop in Copenhagen, June 1978. Therefore discussion was postponed to the next meeting.

(iii) *Nomenclature in Hydrochemistry* (Coordinator: Prof. WAGNER). Prof. WAGNER pointed out, that terms like biodegradability and persistence are often used with different sense. He thinks complete biodegradation should be equivalent with mineralization. For a substance the degree of biodegradation depends on the test method. A synopsis of a few test methods was distributed and members were asked to send further test methods to Dr. SCHWEITZER for setting up a comparative review. Prof. GRAU suggested to use the term Hydrochemistry instead of Water Chemistry, which would be in line with Hydrobiology.

(iv) *Education in Hydrochemistry* (Coordinator: Prof. WAGNER). Prof. WAGNER reported, that university education in chemistry has become so theoretical, that many young chemists have not enough background for solving practical problems like e.g. waste water treatment. A survey should be carried out with a questionnaire to find out to what extent chemists working in industry and in governmental agencies are faced with problems on drinking water purification and waste water treatment. The result of the survey could stress the need for including hydrochemistry in school curricula. The questionnaire will be sent to IUPAC Secretariat to be forwarded to National Chemical Societies, who will be requested to distribute them to their members and recollect them.

(v) *ISO/TC 147 Water Quality* (Coordinator: Dr. BETHGE). Prof. WAGNER gave a review on the ISO/TC 147 meeting held in November 1976 in Copenhagen. It

was of such great interest, that it was decided to mail a list of working groups and proposals to all members.

(vi) *COWAR*: Prof. PEARSON will continue to keep contact with COWAR and inform IUPAC on COWAR's activities.

(vii) *Present state of development and (viii) possible future trends in waste water treatment techniques in chemical industry* (Coordinator: Dr. TROBISCH). Dr. TROBISCH distributed a survey on both projects. By September 1979 he will prepare a paper on 'possible future trends' and also one on the following topics regarding 'present state of development': ultrafiltration; reverse osmosis; waste water purification by extraction. The discussion of these papers in Davos (September 1979) should point to as to whether and how the paper(s) can be modified for presentation at the Stockholm Congress (February 1980).

4. *Name of the Commission*. The Subcommittee on New Projects had proposed to change the name of the Commission. The meeting saw no need for changing name.

5. *Next Meeting*. Some members will meet on 13 June 1978 in Stockholm in connection with preparations for the Stockholm Congress in February 1980. The next official meeting will be held during the 30th IUPAC General Assembly in Davos, 2–10 September 1979.

Present: Prof. WAGNER (Chairman), Dr. TROBISCH (Vice-Chairman), Dr. SCHWEITZER (Secretary), Prof. GRAU, Prof. PEARSON, Mr. SCHJØDTZ-HANSEN (Titular Members); Dr. FREYSCHUSS (Corresponding Member); Mr. GÖRANSSON, Mr. LEMLIN, Mr. SAVISAARI (Associate Members).

IUPAC COLLEAGUES DECEASED

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| <i>France</i> | Prof. M. MAGAT (6th June 1978) – Subcommittee on Symbolism and Terminology in Chemical Kinetics (1978–) |
| <i>Israel</i> | Prof. S. AMIEL (9th August 1978) – Commission on Analytical Radiochemistry and Nuclear Materials (1977–) |
| <i>Switzerland</i> | Prof. G. SCHWARZENBACH (20th May 1978) – Physical Chemistry Division Committee (1955–1959), Commission on Equilibrium Data (1955–1967) |
| <i>UK</i> | Prof. G. J. HOYTINK (11th April 1978) – Commission on Photochemistry (1970–) |

REPORTS OF IUPAC-SPONSORED SYMPOSIA

INTERNATIONAL SYMPOSIUM ON IONS AND ION PAIRS AND THEIR ROLE IN CHEMICAL REACTIONS

Syracuse, NY (USA): 30 May–2 June 1978

The Ion and Ion Pair Symposium, held at the Hotel Syracuse, was dedicated to Dr. MICHAEL SZWARC, distinguished professor at the State University of New York College of Environmental Science and Forestry, Syracuse, NY (USA), honoring him for his many original and outstanding contributions to a better understanding of ionic solution phenomena. The meeting, sponsored by the Syracuse College as well as by IUPAC and the National Science Foundation, featured fourteen invited lectures by scientists from the USA and abroad all of whom are recognized for their pioneering research in the field of ion pairs and solvent or ligand interactions with ionic species. In addition, twenty-two contributed papers were presented in two parallel sessions. The symposium had a truly international flavor with 153 scientists from fifteen countries participating (Belgium, Canada, France, Germany, Italy, Israel, Japan, Libya, the Netherlands, Poland, Spain, Sweden, Switzerland, UK and USA).

The invited lectures were arranged in three sessions. The first session focussed on the structure, energetics and dynamics of ions and ion pairs and their solvation complexes in the liquid, gaseous and solid state. E. GRUNWALD (USA), one of the early coworkers of WINSTEIN, who, with FUOSS, originated the concept of different kinds of ion pairs, dealt with the theory and complications involved in dipole measurements of ion pair–ligand complexes in slightly conductive polar solvents such as anhydrous acetic acid. A comparison of the dipole moments of the ion pairs yields important information about the structure of the solvation complexes. Measurements by P. KEBARLE (Canada) of gas phase ion-molecule equilibria by mass spectrometric techniques has produced accurate thermochemical data on solvent interactions with organic and inorganic molecules. Work on pyridinium cations and phenoxide anions show that substituents that stabilize the ions in the gasphase reduce the hydrogen bonding interactions of the solvent with the ion. A new technique of studying the dynamics of ion pairing in solution by using electric field effects was discussed by A. PERSOONS and M. VANBEYLEN (Belgium). They were able to obtain detailed information on the rates of dissociation and association of inorganic as well as organic ionic species. Working with the fluorenyl salts in low polarity ethereal solvents they demonstrated the importance of triple ion equilibria in such systems.

Ion pair phenomena in both solution and the solid state were discussed by E. DE BOER (Netherlands). NMR experiments of glyme complexes with biphenylalkali salts in various solvents provided structural information on such complexes. These results were then compared with crystal structures obtained for these systems, which, for triglyme and tetraglyme, are solvent separated ion pairs. All crystals were shown to exhibit an exchange narrowed ESR line with an orientation dependent linewidth due to dipolar interactions between the spin. N. VELTHORST (Netherlands) elaborated on her extensive investigations of the structures of ions pairs of carbanions and nitranions as determined by optical and NMR spectroscopy. Detailed information could be obtained about the position of the cation with respect to the anion, as well as on the solvation state of the ion pairs in the excited state.

The second session dealt with a number of aspects on the design and properties of ion binding ligands, notably the crown ethers and cryptands. A. I. POPOV (USA) described his interesting multinuclear NMR investigations on the structure of alkali ion complexes with crown ethers and cryptands in nonaqueous solvents. The results make it possible to acquire information on the conformational changes accompanying the cation binding to the ligand, as well as the detection of solvent molecules bound to the ligand–cation complex. When the crown ether ligands are attached to a macromolecule, their selectivity in binding cation can drastically change. This was discussed by J. SMID (USA), who showed that some of these poly (crown ethers), when dissolved in water, act as polysoaps, and strongly bind large organic anions. This hydrophobic interaction can be augmented electrostatically by adding crown complexable cations. The highlight of the symposium undoubtedly was the excellent presentation of J. M. LEHN (France), the ‘father’ of the cryptands. In his lecture he demonstrated how a skilful manipulation of the cryptand structure can lead to ligands of high cation selectivity, sometimes producing binuclear cation–crypt and complexes in which small molecules can be inserted between the two cations, thereby mimicking a catalyst surface. He also dealt in detail with the design of molecular receptors that mimic enzymes.

The third session focussed on the role of ion pairs in chemical reactions, and their effect on reactivity and stereochemistry. E. M. ARNETT (USA) reviewed the relationship between structure and reactivity of alkali salts of a series of beta-diketones in dimethylsulfoxide. Ion pairing of enolate anions is a topic of great interest at present because of their role as intermediates in the important class of base catalyzed carbonyl reactions. The cyclic enolate anions were found to be more stable

than the acyclic analogues. The pulse radiolysis method for studying fast reactions of carbocations in solution was discussed by L. M. DORFMAN (USA). In a very lucid presentation he demonstrated how rate constants of reactions of phenylcarbenium and cyclopropylphenylcarbenium ions with various nucleophiles such as halide ions, amines and water can be obtained. The observed reactivity trends with substituted carbenium ions were discussed in terms of steric and electronic effects. T. E. HOGEN ESCH (USA) dwelt on the detailed mechanism of the highly stereoselective oligomerization of 2-vinylpyridine and the subsequent methylation of the carbanion. He showed that the alpha-carbon stereochemistry is consistent with a cation side attack of electrophile on the carbanion, with stereoselectivity resulting from unequal proportions of diastereomeric ion pairs. In an interesting and original paper, C. D. RITCHIE (USA) developed a simple model for solvent effects on cation-anion combinations, the model consisting of two charges and eight finite dipoles interacting through coulombic forces and $(1/r)^{12}$ repulsions. The calculations show local minima in the potential energy surface corresponding to tight and loose ion pairs, with reaction paths and saddle points connecting the species. A. LEDWITH (UK) dwelt on the formation and reactivities of free ions in cationic polymerization. He discussed at length the reactivity behaviour of vinylcarbazols, vinyl ethers and vinylsiloxanes using stable carbocations such as triphenylmethyl and tropylium ion as initiators, demonstrating how current theories of stereoregulation in some of these polymerization processes are supported by the experimental data. Finally, M. SZWARC (USA) in his closing remarks, briefly reviewed the current state of ion pair studies and ion solvation phenomena. He illustrated with a few pointed examples how the original concepts of FUOSS and WINSTEIN on the structure of ionic solutions, especially their hypothesis on the existence of different types of ion pairs, have been confirmed by the application of a variety of experimental techniques in the study of ionic solutions. These investigations have been crucial in rationalizing a host of peculiar phenomena that can be observed in ionic reactions and that up to recently were hard to explain. The contributed papers provided clear evidence that the topic of the symposium is still of great current interest, and is being tackled in a large number of laboratories all over the world. Several participants expressed their satisfaction with the quality of the papers presented at this symposium. And both at the banquet and during the talks, many spoke highly of the diverse and original contributions of Dr. SZWARC that still is providing scientists with a wealth of information on ion pair reactions with ramifications in many branches of chemistry.

J. SMID

1978 IUPAC PRAGUE MEETINGS ON MACROMOLECULES

Prague: July 1978

The Prague Meetings on Macromolecules held yearly since 1967 have been arranged in the two traditional forms, i.e. microsymbosia and discussion conferences.

Each *microsymposium* has usually 8–9 invited lectures on its programme. Contributed papers, the number of which varies between 30 and 60, are presented as short communications (10–15 min) or posters (since 1976). As a rule, one to three panel discussions are organized during four days of the microsymposium programme. The programme framework of each *discussion conference* has 12–16 invited lectures. The remaining time is reserved for 6–8 discussion sessions, the form of which is now stabilized; panel discussion sessions deal only with problems selected in advance, while poster discussion sessions cover all conference topics. Both forms proved their vitality, the panels being focussed on plenary discussion of selected problems and the posters allowing the widest individual exchange of ideas. Active participants can amply profit by results presented by other scientists, while young researchers and postgraduate students have a good opportunity to enrich their experience by their presence and activity at an international forum under favourable (not too official) conditions.

This July, two meetings on macromolecules were held in Prague – the 18th Microsymposium ‘Synthetic and Semisynthetic Polymer Catalysts and Affinants’ (10–13 July) and the 6th Discussion Conference ‘Chromatography of Polymers and Polymers in Chromatography’ (17–21 July).

18th Microsymposium: Synthetic and Semisynthetic Polymer Catalysts and Affinants (10–13 July)

The 18th Microsymposium is thematically related to the 2nd Discussion Conference ‘Macromolecular Matrices and Carriers of Biological Functions’ (1972), 13th Microsymposium ‘Transformations of Functional Groups on Polymers’ (1973), and the 17th Microsymposium ‘Medical Polymers: Chemical Problems’ (1977). However, the scientific programme of this Microsymposium was limited to important problems connected with the preparation and use of macromolecular catalysts and affinants, including the relation between their structure and properties. The following nine invited lectures were presented at the Microsymposium:

- C. G. OVERBERGER (Ann Arbor, USA): Some Observations on Polymeric Catalysts
- F. S. DYACHKOVSKII (Moscow, USSR): The Synthesis and Catalytic Properties of Complexes of Transition Metals Immobilized on the Surface of the Hydrocarbon Polymer Backbone
- PH. TEYSSIÉ (Liège, Belgium): Specific Goals for Polymeric Catalysts; the Example of Biometallic μ -Oxoalkoxides
- M. IMOTO (Osaka, Japan): Radical Polymerization of Methyl Methacrylate with Macromolecule in the Presence of Aqueous Solution of Cupric Ion
- I. V. BEREZIN (Moscow, USSR): The Effect of Polymeric Matrix on the Functions and Properties of Immobilized Enzymes
- G. V. SAMSONOV (Leningrad, USSR): Thermodynamical and Kinetic Regularities in the Interaction between Synthetic and Semisynthetic Polymers with Enzymes during their Immobilization and Modification
- C. R. LOWE (Lund, Sweden): Immobilized Nucleotides and Coenzymes for Affinity Chromatography

—G. CHALLA (Groningen, The Netherlands): Copper Polymer Complexes as Catalysts for Oxidative Coupling

Prof. K. MOSBACH (Lund, Sweden) and Prof. R. S. NEZLIN (Moscow, USSR) were not able to attend to present their lectures. All invited lectures will be published in *Pure Appl. Chem.*

It is obvious from this list that the Microsymposium dealt with very diverse aspects of its apparently monothematic programme. However, this has already been indicated by a wide spectrum of sub-problems specifying the individual topics. A variety of practical and theoretical aspects was then affirmed by 35 short communications and posters. Even if this diversity could act disturbingly (which it did to some extent) the aim of the Microsymposium was clear and moreover stressed by a single panel discussion on 'Problems and prospects of industrial application of polymeric catalysts'. The main asset of the Microsymposium can be seen in the fact that about 75 academic and industrial experts (from 18 countries) engaged in various scientific and technical branches had a good opportunity to discuss all aspects of this complex and multifacet problem which is of such importance for practical applications and science.

6th Discussion Conference: Chromatography of Polymers and Polymers in Chromatography (17–21 July)

The 6th Discussion Conference dealt with the two aspects of the relationship between polymers and chromatography: chromatography as a tool for separation and characterization of polymers and, inversely, polymers (sorbents or stationary phases) as a tool for performing the chromatographic separation of diverse compounds.

The 'backbone' of the Conference programme consisted of 13 invited lectures:

- J. C. GIDDINGS (Salt Lake City, USA): Field-Flow Fractionation of Polymers
- J. V. DAWKINS (Loughborough, UK): Theory of Gel Permeation Chromatography, Mechanism of Separation and the Influence of Polymer–Sorbent Interaction
- K. H. LIESER (Darmstadt, FRG): New Ion Exchangers: Preparation, Properties and Application
- J. F. K. HUBER (Vienna, Austria): Retention Mechanism in Liquid Chromatography
- G. V. SAMSONOV (Leningrad, USSR): Irreversible Dynamics of Sorption and Chromatography on Ion Exchangers with a Surface Layer of Polyelectrolyte
- P. MOHR (Berlin, GDR): Molecular Aspects of Affinity Chromatography
- J. GUILLET (Toronto, Canada): Fundamental Studies of Polymer Structure and Interactions by Gas-Liquid Chromatography
- B. G. BELENKII (Leningrad, USSR): Adsorption Chromatography of Polymers
- H. INAGAKI (Kyoto, Japan): Newer Application of Thin Layer Chromatography to Polymer Chemistry
- J. R. MILLAR (Redwood City, USA): Some Aspects of Organic Polymer Sorbents and their Evaluation
- B. H. J. HOFSTEE (Palo Alto, USA): Non-Ionic Adsorption Chromatography and Adsorptive Immobilization of Proteins

—J. PORATH (Uppsala, Sweden): Charge Transfer Chromatography in Aqueous Systems

Their titles sufficiently characterize the scope of the Conference. In addition to the invited lectures, 43 discussion contributions were discussed – nearly exclusively in the poster form (in four poster sessions); about 15 invited and coopted discussion contributions were presented in four panel discussions (about 98 participants from 18 countries attended this meeting).

In fact, the two aspects of the Conference programme just mentioned could be perceived rarely, as its diversity was nearly effaced by a series of papers that dealt with the correlation of several Conference problems. The Conference had an important advantage that it brought together experts in chromatography and polymer chemistry (as well as other chemists, biochemists, biophysicists, biologists etc.): it is only discussion, exchange of ideas and confrontation of views, which can lead to a better understanding of both chromatographic processes and polymer sorbent properties. Since the 'polymer–chemistry aspects' of the Conference was expressed most adequately in the lecture by Dr. J. R. MILLAR, we shall, in concluding this report, partly quote and partly paraphrase his words: '... because it is rare for a production chemist to be an expert chromatographer, and rarer for a chromatographer to be an expert polymer chemist, it is probable that most separations are carried out under non-optimum conditions, at least so far as the sorbent–sorbate–solvent system is concerned . . .'. If any of the Conference contributions 'lead in any way to a closer approximation to the matching of sorbent with problem', they have fully substantiated this type of meeting.

We do hope that both the Microsymposium and Conference contributions will be found useful and important for further progress in the research and application of polymeric sorbents, catalysts and affinants.

B. SEDLÁČEK

VII INTERNATIONAL SYMPOSIUM ON PHOTOCHEMISTRY

Heverlee (Leuven): 24–28 July 1978

The venue of this well established biennial meeting was the spacious campus of the Catholic University. The 255 active participants from 22 countries included for the first time photochemists from Egypt, Iraq and Rumania. An interesting and extensive programme had been assembled by the organizing committee under the chairmanship of Prof. N. J. TURRO (Columbia). It consisted of 13 plenary lectures, 23 shorter presentations (selected from a list of 77 contributed), workshops on solar energy conversion (M. GRAETZEL and M. WRIGHTON), on new experimental techniques (J. JOUSSOT – DUBIEN) and on biradical intermediates (P. WAGNER), as well as discussion-lectures on micelles photochemistry (N. TURRO) and on electron transfer reactions (A. WELLER).

After an opening address by Prof. SMETS, President of IUPAC, the proceedings started with a lecture by N. C. YANG (Chicago) who described recent work of his

group on the chemistry of exiplexes, in particular those formed between anthracenes and hexadienes. In the second lecture J. KOSSANYI (Paris) gave a wide-ranging survey of the synthetic uses of photocycloaddition in the field of natural products (e.g. prostaglandins and pheromones). The high selectivity at low temperature of the photochemical pathway was convincingly demonstrated. N. E. EPIOTIS (Seattle) outlined an interesting proposal for the description of chemical events by potential energy surfaces constructed from a Linear Combination of Fragment Configurations.

The second day was concerned with subjects of industrial interest. G. GEUSKENS (Brussels) discussed the singlet oxygen- and the free radical mechanisms of polymer photo-oxidation and was able to bring remarkable clarity to a complex and important subject. J. L. R. WILLIAMS (Eastman Kodak) reviewed recent work in the Eastman Kodak Laboratories on the spectral sensitization of photopolymers and related topics. A. M. TROZZOLO (Notre Dame) presented his work on the photorearrangement of aziridines and oxiranes to ilyds. Some of these systems have useful photochromic properties, the thermal reversal of their ilyds being slow at room temperature.

J. JOUSSOT-DUBIEN (Bordeaux) investigated the competition between electron abstraction and quenching in the photobleaching of thiazines and oxonines and could show that in these processes both the singlet and the triplet pathways have to be considered. D. SCHULTE-FROHLINDE (Mulheim) gave a comprehensive kinetic analysis of the isomerization of 4-nitrostilbenes, which to a large extent follows a triplet pathway.

The fourth day of the Symposium was devoted to inorganic photochemistry. V. BALZANI (Bologna) gave an excellent review on electron transfer reactions in transition metal complexes. Some of these photoprocesses are of potential interest in solar energy conversion. A. ADAMSON (USC, Los Angeles) presented a broad view of the photoprocesses occurring in well defined metal complexes, restating and amending the rules which govern the destabilization and reactivity of ligands.

On the final day R. KAPTEIN (Groningen) reported recent progress in the photo-CIDNP effect of amino acids and proteins, a subject of interest in photobiology. O. L. CHAPMAN (UCLA) gave a review on the photochemical rearrangement of azo-compounds and aromatic azides at 8 K. The meeting was concluded by H. KUHN (Gottingen) who described recent experiments demonstrating electron transfer in monolayer assemblies. It appears that in such molecular organizes electron tunnelling can be the dominant process. This opens a whole new field of solid state photophysics. Of the shorter contributions a paper by TURRO's group deserves mention, where it was shown that photochemistry in detergent micelles might be of interest in isotope separation.

It was generally felt that the symposium had been successful and had given a useful perspective view of current photochemical research. The next meeting, in 1980, will be organized by a committee led by Prof. H. DUERR of Saarbrücken.

A. REISER

IV INTERNATIONAL CONGRESS OF PESTICIDE CHEMISTRY

Zürich (Switzerland): 24–28 July 1978

The congress, sponsored by IUPAC and organized by the Swiss Society of Chemical Industries, was held at the Swiss Federal Institute of Technology (ETH) in Zürich, Switzerland. A large number (1350) of scientists from 52 different countries and 150 accompanying persons attended the meeting. The largest delegations came from the Federal Republic of Germany (228), Switzerland (190), USA (146) and UK (107). However, there were also sizeable groups from Japan (55), The Netherlands (48), France (41), Italy (35), Hungary (35), USSR (31) and Israel (31), and representatives from such distant countries as New Zealand, Australia, India, Kenya, Nicaragua, Venezuela and Brazil. Donations by the Swiss Chemical Industry and other trade and commercial societies made it possible to keep the registration fee down to a reasonable level and to subsidize a considerable number of chairmen and invited speakers.

Following an informal get-together on 23 July, the Opening Ceremony took place on 24 July in the new congress hall of the ETH. Participants, guests of honour and the media were welcomed by Dr. E. KNUESLI, chairman of the executive committee. A message from IUPAC was conveyed by Dr. H. FREHSE, member of the Applied Chemistry Division Committee. The congress was then officially opened by Dr. h.c. E. BRUGGER, former member of the Swiss Federal Council. The ceremony was enlivened by a much-applauded childrens' choir.

The congress atmosphere and the social programme (free of charge), benefited from the excellent weather conditions. A Welcome Reception in the Lichthof of the University was hoisted by the authorities of the Canton and City of Zürich and featured Swiss folk music and Swiss speciality snacks and drinks. The highlight was provided on 27 July by an evening boat trip on the Lake of Zürich. More than 1200 persons enjoyed this event, which was hoisted by the Swiss Society of Chemical Industries.

Particular attention was devoted to ensuring that participants were kept well informed. They received a special issue of the European trade journal *Chemische Rundschau*, which explained the aims and scope of the congress in several articles. In addition a congress bulletin was distributed each day.

Scientific Programme

The scientific programme included a plenary session, 14 symposia, 14 workshops and 13 discussion (poster) sessions and was divided into the following main topics: (i) Synthesis of pesticides; (ii) Chemical structure and biological activity; (iii) Natural products with biological activity; (iv) Biochemistry of pests and mode of action of pesticides; (v) Pesticide degradation; (vi) Pesticide residues; (vii) Formulation chemistry.

The Scientific Programme Committee had arranged for 117 invited papers and accepted 385 contributions from participants. Of this total of 502 registered and abstracted papers, 465 were actually presented at the meetings.

Plenary Session. The plenary session 'World Food Production-Environment-Pesticides' was organized to reach two different audiences: (a) the convened pesticide scientists, and (b) the general public, which continues to show keen awareness and, all too often, suspicion of pesticides and chemicals in general. As A. S. TANCO JR., President of the World Food Council, had been obliged to cancel his assignment at the last moment, the session was led off by E. KNUESLI (Switzerland) with a lecture on 'Objectives and Strategies of World Food Production'. He was followed by K. V. NOVOZHILOV (USSR) who covered the theme 'The Future of Plant Protection in Agriculture'. J. A. KOEMAN (The Netherlands) dealt with the question marks raised by 'Chemicals in the Environment and their Effects on Ecosystems', and the picture was completed by D. HENSCHLER (Federal Republic of Germany), who critically discussed 'The Toxicologist's Responsibility in the Evaluation of Plant Protectants'. As a bridge to the scientific part of the congress programme, J. E. CASIDA (USA) developed his thoughts and recommendations on 'Pesticide Research to Maintain and Improve Plant Protection'.

The plenary session was followed by a press conference. More than 30 representatives of the international and national press experienced a lively dialogue with and among the plenary speakers on various aspects of plant protection.

The plenary lectures will be published as a separate booklet and also together with the symposia papers in a special volume *Advances in Pesticide Science* by Pergamon Press, the official publisher of IUPAC.

Symposia. The morning symposia had been organized to cover themes which are under active experimental investigation, and which appeared to be of particular scientific and/or practical significance. Each symposium consisted of 4 invited papers and 3-4 selected short communications. Although some sessions lacked the envisaged and anticipated novelty and originality of presentation, others indeed opened new vistas and provided some original ideas. Of particular interest were the symposia on 'Heterocyclic chemistry in pesticide synthesis' and 'Organometallic and organophosphorus chemistry for synthesizing new pesticides'. In contrast to the usual format, the two sessions on 'Pesticide Residues' refrained from methodology and concentrated on a well-received discussion of data evaluation and interpretation.

Workshops. The 14 afternoon-workshops were meant to be platforms for discussing defined areas which are in a state of controversy or exploration. Unfortunately, a number of sessions turned into a lineup of mere presentations. They lacked the desired structuring of discussion which can only be achieved by careful planning in advance and the preparation of pertinent questions. However, some workshops, including those on quality control, new synthetic methods, potential longterm toxic effects as related to chemical structure, relevance and use of model ecosystems, and concepts for finding new pesticidal structures, provoked the anticipated dialogue.

Discussion (Poster) Sessions. As an experiment, the organizers completely abandoned the classical

'General Sessions' for short communications and replaced them by 13 poster sessions. The bulk of such contributions (more than 250) was thus presented as posters. Although there was first some reluctance of registrants to accept this approach, the actual sessions were a success and were enthusiastically received by most participants. The standard of presentation and the numerous intensive discussions which took place in the large corridors of the ETH were impressive.

H. GEISSBUEHLER

VI INTERNATIONAL SYMPOSIUM ON MEDICINAL CHEMISTRY

Brighton (UK): 4-7 September 1978

This symposium was organized at the University of Sussex by the Society for Drug Research under the joint sponsorship of the International Union of Pure and Applied Chemistry, the European Federation for Medicinal Chemistry and the Fédération Internationale Pharmaceutique. It was attended by over 730 delegates from twenty-eight countries (including the People's Republic of China).

The symposium was opened by Dr. J. F. CAVALLA, Chairman of the Symposium, and at the opening ceremony delegates were welcomed by Prof. ALAN JOHNSON, FRS, Immediate Past-President of the Chemical Society speaking on behalf of the University of Sussex and by Prof. J. MATHIEU speaking as the official representative of IUPAC. There were four plenary lectures, one for each day of the meeting:

Dr. LINUS PAULING, FRS, Nobel Laureate spoke enthusiastically on 'Ascorbic Acid in Relation to Disease' showing among other things how clinical trials have demonstrated the value of substantial dietary supplements of Vitamin C in patients with cancer and certain viral diseases. The theoretical rationale underlying the use of Vitamin C was explained by Dr. PAULING who showed that only man and the apes were unable to synthesize this vitamin and needed extraneous supply.

Sir JOHN CORNFORTH, FRS, Nobel Laureate gave a distinguished account of the 'Spatial Compulsions of Enzymes' whereby the stereospecific characteristics of enzymic reactions were shown to be integral to the transformation of natural products into bioactive molecules.

Dr. JOHN VANE, FRS presented an enthralling up-to-date report on his researches into 'Prostaglandins, Platelets and Vascular Disease'. The topicality and importance of this subject was made even more apparent by the lucidity of Dr. VANE's presentation. His demonstration of the nature and utility of prostacyclin (PGI₂) was received with admiration by the very large audience.

Finally, Sir ARNOLD BURGEN, FRS decried his elegant work on the properties of 'Muscarinic Receptors'. By exploring the binding of radioligands to cell membrane fragments Sir Arnold has been able to explore the geometry of the actual binding site and by such means allow the better design of novel agonists and antagonists.

Following the plenary lectures the meeting then split into three concurrent sessions to accommodate a total of twelve individual symposia. These were Cardiovascular Disease, organized by Dr. R. HOWE; Peptides acting on the Central Nervous System, organized by Dr. CATHERINE WILSON; Cyclic Nucleotides, organized by Dr. M. HOOPER; Histamine and its Receptors, organized by Dr. R. BRIMBLECOMBE; the Application of Drug Metabolism to Drug Design, organized by Dr. J. D. COOMBES; Theoretical Approaches to Drug Design, organized by Dr. A. M. ROE; Cancer Chemotherapy, organized by Dr. A. M. CREIGHTON; Prostaglandins and Thromboxanes, organized jointly by Dr. R. J. FLOWER and Dr. S. MONCADA; Receptor Differentiation, organized by Dr. C. R. GANELLIN; Bronchial Asthma, organized by Dr. D. JACK; Antibiotics and Anti-infectives, organized by Dr. D. BUTT; and Drugs acting on the Dopamine Receptor, organized by Dr. R. LONG.

All told sixty-five invited lecturers, many from overseas, spoke at these symposia. In every case speakers were chosen as representing the forefront of the topic on which they spoke. All those scientific disciplines related to drug discovery were represented among the speakers: chemists, pharmacologists, biochemists, theoretical chemists, clinical pharmacologists, physicians, toxicologists and pharmacists. In each symposia the organizer acted as Chairman of his or her meeting and received the credit for its success.

Allied to this very active programme of lectures two lengthy poster sessions were arranged at which 113 posters were displayed.

The social programme included two receptions, the first at the University and the second at the Royal Pavilion at which the delegates were received by the Mayor and Mayoress of Brighton. Two concerts were arranged, one by the renowned Ronnie Scott Jazz Quintet and the other, an Organ Recital by Stephen King. The symposium banquet was held very successfully at the University when the toast to the speakers was proposed by Dr. J. F. CAVALLA and response made by Dr. PAULING. Prof. E. J. ARIENS proposed the continued success of the Society for Drug Research.

While the overall success of the meeting was determined in major part by the eminence and skill of the invited speakers, it is true to say that having the large majority of the participants and speakers together on the beautiful University of Sussex campus enabled the maximum benefit and pleasure to be obtained. The proceedings of the Symposium will be published early in 1979 by Cotswold Press, Oxford.

J. F. CAVALLA

IV IUPAC CONFERENCE ON PHYSICAL ORGANIC CHEMISTRY

York (UK): 4–8 September 1978

This fourth in the series of international conferences on physical organic chemistry was held on the campus of the University of York under the sponsorship of

IUPAC and the Faraday and Perkin Divisions of The Chemical Society. Almost 300 active participants attended the meeting and they had affiliations in 33 different countries embracing all five continents. Regretfully, there were no participants from the USSR, although contributed papers had been accepted from a number of institutions there and space had been allocated in the programme.

The conference began with opening remarks and words of welcome from Prof. V. GOLD on behalf of the Organizing Committee of which he was chairman, Prof. H. ZOLLINGER on behalf of IUPAC and Prof. R. O. C. NORMAN on behalf of the hosts, the University of York.

The theme of the conference was chemical reactivity, embracing in particular structural effects, the role of the environment and of catalysts, and new techniques. The nine plenary lecturers had been chosen to highlight these three aspects: 'Chemistry Without Solvents: Properties and Reactions of Organometallic Complexes in the Gas Phase' given by J. L. BEAUCHAMP, 'Aspects of the Determination of Equilibration Rates by NMR Spectroscopy' by J. D. ROBERTS; 'Chemistry of Interfacial Organic Processes' by F. M. MENDER, 'Methyl Transfer Reactions' by W. J. ALBERY, 'Fast Reaction Kinetics by ESR Methods' by R. O. C. NORMAN, 'Properties of Aromatic Ions Generated at Electrodes' by V. D. PARKER; 'Electron Photoejection and its Applications in Kinetic and Spectroscopic Studies', by M. SZWARC, 'Organic Reactions in the Solid Phase: Accident and Design' by J. M. THOMAS and finally 'Macrocyclic Receptor Molecules: Aspects of Chemical Reactivity. Investigations into Molecular Catalysis and Transport Processes' by J.-M. LEHN. The high standard set at previous conferences in the series was well maintained and all the lectures were warmly received. The plenary lectures will be published in *Pure Appl. Chem.* and, it is hoped, also as Conference Volume by Pergamon Press.

Some 87 twenty-minute contributed papers were presented orally in three parallel streams each extending over four of the conference's five days. It proved possible to arrange within these streams sessions on such specific topics as kinetic isotope effects, intramolecular catalysis, Meisenheimer complexes, and linear free energy relations. A further 54 papers were accepted for poster presentation with authors available for discussions in two afternoon sessions. A new feature in this conference was the inclusion in the poster sessions of papers presented orally. This proved a popular innovation; it provided opportunities for lengthier and more detailed discussions than possible in a tight lecture schedule, and it also compensated for the participants' inability to attend all three oral sessions simultaneously. All the contributions and ensuing discussion attested to the vigour of the field of physical organic chemistry and to the enthusiasm of workers in that field.

One two-hour plenary session was devoted to the activities of the IUPAC Commission on Physical Organic Chemistry and in particular to the efforts of its working parties on the compilation of a glossary of terms used in the field and on the establishment of a system of naming organic chemical transformations. The session was used to solicit comment on this work. The glossary, drafts of which had been widely

distributed to chemists in various fields and a copy of which had been provided for each participant, was generally welcomed as a valuable guide to current usage. On the naming of transformations, however, there was some feeling that the views of more synthetically inclined organic chemists should also be ascertained.

Besides the full and demanding scientific sessions, the local organizers arranged with great efficiency

a wide-ranging programme of social events in the evenings and (for accompanying members) during the day. This catered for the physical organic chemists' interest in matters gastronomic, folk-cultural, mechanical, historical and geographic. The generosity of the host university and six industrial sponsors, most notably I.C.I. Ltd., enabled emphasis to be laid on the first.

D. BETHELL

COGENE INTERNATIONAL CONFERENCE ON RECOMBINANT DNA

Wye (Kent, UK): 1-4 April 1979

An International Conference on Recombinant DNA will be held at Wye Agricultural College, near Ashford, Kent, UK, during 1-4 April 1979, sponsored by the ICSU Committee on Genetic Experimentation (COGENE) and the Royal Society (UK). The Conference will be followed by a press conference on 5 April 1979 at the premises of the Royal Society in London. Accommodation will be provided to participants (number restricted to 140) in Wye Agricultural College (University of London) but participants will need to arrange their own travel to UK. The official language of the Conference will be English.

Scientific Programme

The purpose of the Conference is to review the current status of recombinant DNA research and technology and discuss matters of mutual concern such as support

for the research, regulation of the research through guidelines and legislation, and the eventual practical applications of the technology. Other related forms of genetic experimentation will be discussed as appropriate.

Space will be available for the exhibition of publications. Those wishing to exhibit journals etc. should write to the Royal Society before 1 March 1979.

Correspondence

Correspondence with regard to registration and accommodation should be sent to: COGENE Conference, c/o The Executive Secretary, The Royal Society, 6 Carlton House Terrace, London SW1Y 5AG, UK.

Correspondence concerning the scientific programme should be sent to: Dr. J. TOOZE, Secretary COGENE, EMBO, Postfach 1022.40, Heidelberg 69, FRG.

FORTHCOMING IUPAC-SPONSORED SYMPOSIA

CHEMISTRY JOURNALS AND THEIR INTERFACES

An International Seminar for Editors

Bischenberg (near Strasbourg): 8–10 May 1979

An International Seminar for editors of primary journals in chemistry will be organized under the auspices of IUPAC at Bischenberg (near Strasbourg), France during 8–10 May 1979. The Seminar will discuss rules, attitudes and developments that are important for editors to know in order that they can do their work effectively. It will be devoted to a study of the various interfaces of the work of editors and will include introductory lectures, discussions and some demonstrations. Attendance will be limited to about 50 editors of primary journals in chemistry selected from applications on a first come first served basis. Accommodation will be provided but participants will need to make their own arrangements for travel. It will be mandatory for participants to spend three full days at Bischenberg to ensure efficient interactions between them.

Dr. H. GRÜNEWALD (FRG) will be the Chairman of the Seminar with Prof. G. OURISSON (France) as the Secretary.

Programme

Provisional programme envisages the inclusion of the following topics: (i) Introduction: Dr. H. GRÜNEWALD; (ii) IUPAC activities related to journal editing; (iii) Terminology: nomenclature, units, symbols (organic, inorganic, macromolecular, analytical, physicochemical . . .); (iv) Primary journals and the secondary services: Chemical Abstracts Service, Institute of Scientific Information, etc.; (v) Primary journals and the libraries; (vi) Primary journals and the author; (vii) Primary journals and the reader; (viii) Primary journals and the referees; (ix) Primary journals and the publishers: economics of journal publishing; (x) News journals vs. primary journals in chemistry; (xi) Methodology: modern methods of setting and printing; their impact on editors; (xii) Methodology: modern methods of literature search; their impact on editors.

Proceedings of the Seminar will not be published in order to allow for lively, informal and unrestricted discussions of all relevant topics.

Correspondence

Enquiries and correspondence concerning the Seminar should be addressed to: International Seminar for

Editors, Institut de Chimie, Université Louis Pasteur, BP 296/R 8, 1 Rue Blaise Pascal, F-67008 Strasbourg, France. Tel. 88–614802.

VI INTERNATIONAL CONFERENCE ON SOLID COMPOUNDS OF TRANSITION ELEMENTS

Stuttgart (FRG): 12–16 June 1969

The VI International Conference on Solid Compounds of Transition Elements is planned to be held in Stuttgart on 12–16 June 1979. The meeting forms part of a series of conferences, of which the previous ones were held in Paris-Orsay (1965), in Enschede-Twente (1967), in Oslo (1969), in Geneva (1973), and in Uppsala (1976). The recommended language is English; translation facilities will not be available.

Scientific Programme

The Conference will deal with structural, physical and chemical properties of solid compounds of transition elements, especially those containing hydrogen, boron, carbon, silicon, germanium, nitrogen, phosphorus, arsenic, antimony, sulfur, selenium, and tellurium. Oxides and halides, are, however, not included.

The aim of the conference is to bring together chemists and physicists, who are investigating, experimentally and theoretically, the structural and physical properties (e.g. electrical, magnetic, optical) as well as chemical properties (e.g. the role of stoichiometry and thermodynamics) and other relevant physicochemical properties of the compounds mentioned as well as their chemical bonding. In this manner the conference will have an interdisciplinary character. Contribution on prospective technical applications of these materials would also be welcome.

The program will consist of invited lectures and contributed papers. However, since the organizers wish to avoid parallel sessions, it may be necessary to limit the number of papers to be presented. Intending participants should send their contributions to the address given at the end of the announcement. Contributions in languages other than English should be accompanied by an extended abstract in English.

Correspondence

Enquiries and correspondence concerning the conference should be addressed to: Prof. HEINZ

**XXI COLLOQUIUM SPECTROSCOPICUM
INTERNATIONALE
and
8TH INTERNATIONAL CONFERENCE ON
ATOMIC SPECTROSCOPY**

Cambridge (UK): 1–6 July 1979

The Colloquium and Conference, organized by The Association of British Spectroscopists, will be held in Cambridge (UK) during 1–6 July 1979. Both meetings have been sponsored by IUPAC, The Royal Society, The Chemical Society and The Institute of Physics. Accommodation will be provided in double or single rooms in some colleges of the University of Cambridge. The colleges selected are all close to the lecture theatres, dining facilities and exhibition. Alternatively, participants can make their own arrangements. Papers may be presented in English, French or German, but there will be no facilities for simultaneous translation.

Scientific programme

The scientific programme will encompass all branches of spectroscopy with emphasis on Analytical Spectroscopy. There will be one, two and three day symposia devoted to particular areas and specific applications of spectroscopy, and topics will include: Molecular Spectroscopy; X-Ray Spectroscopy; Optical Emission Spectroscopy; Atomic Absorption Spectroscopy; Atomic Fluorescence Spectroscopy; Gamma Ray and Neutron Activation Techniques; Auger, ESCA and Photoelectron Spectroscopy; Mass Spectroscopy; Trace Analysis; Environmental and Biomedical Analysis; Solution Analysis; Polymer Analysis; Automation and On-line Processes; Industrial Applications; and Safety Aspects.

The provisional timetable incorporates five parallel lecture sessions arranged to minimize overlap of related topics and to facilitate the movement of participants between sessions. Each symposium will open with an invited lecture by an internationally recognized speaker on a topic of special significance. As at present is hoped that the invited speakers will include:

| | |
|--------------------------------------|-------------------------------------|
| Y. BELAEV (USSR) | J. J. HOSTE (Belgium) |
| L. S. BIRKS (USA) | R. JENKINS (USA) |
| P. W. J. M. BOUMANS (Netherlands) | J. KOENIG (USA) |
| R. CASTAING (France) | K. LAQUA (FRG) |
| D. CLARK (UK) | B. V. L'VOV (USSR) |
| M. J. COLLES (UK) | W. VON PHILIPSBORN (Switzerland) |
| J. GRASSELLI (USA) | R. O. SCOTT (UK) |
| E. HAMILTON (UK) | D. H. WILLIAMS (UK) |
| R. HERRMAN (FRG) | H. A. WILLIS (UK) |

Papers describing original work are invited and intending authors should submit the title of their contributions and an abstract of 50 words in the

language of presentation. In addition it would be helpful if an English translation is provided. Authors of accepted papers will receive special typing paper on which to submit a 300 word extended abstract in English, French or German for publication in the Official Conference Book of Abstracts – available on registration. These typed sheets should be returned not later than 15 January 1979. A minimum of 20 minutes will be allowed for the presentation of each paper with additional time for discussion. The Conference Proceedings will contain invited lectures and will be despatched to all registrants, free-of-charge, towards the end of 1979.

Poster sessions will be featured at the conference, for material which is better suited to this manner of presentation.

An integral part of the Conference will be the Exhibition. Several large halls will house large and small instrumentation, equipment, accessories, and books, throughout the week.

Correspondence

Enquiries and correspondence concerning the meetings should be addressed to: Association of British Spectroscopists, XXI CSI/8th ICAS, POB 109, Cambridge, CB1 2HY, UK.

**III INTERNATIONAL CONFERENCE
ON CHEMICAL EDUCATION**

**The Teaching of Chemistry – Interaction between
Secondary and Tertiary Levels**

Dublin (Ireland): 27–31 August 1979

An International Conference on Chemical Education, organized by the Royal Irish Academy and Institute of Chemistry of Ireland, will be held in the new Conference Centre of Trinity College, Dublin, Republic of Ireland. The Conference has been sponsored by IUPAC and Federation of European Chemical Societies (FECS); it has also received co-sponsorship from UNESCO and International Council of Associations of Science Education (ICASE). Accommodation will be available in Trinity College and in nearby students' halls of residence together with a wide choice of hotels. The Conference travel agent will arrange package tours and full details will be available from the organizers later on. The official language will be English but the organizers hope to provide translation facilities for group discussions.

Scientific Programme

The object of the Conference is to clarify the purpose of school chemistry courses and of First Year Higher Education courses. Such courses must provide for: (i) Those who will study chemistry in higher education; (ii) Those who will study in higher education subjects that require chemistry as an ancillary; (iii) Those for whom chemistry is not a professional prerequisite. The Conference will attempt to determine in what manner these three objectives can be achieved, what role

colleges/universities should play in determining school chemistry curricula and how the school-to-higher education transition can be facilitated.

Plenary position papers will be given by speakers from Secondary and Tertiary level on three main areas: (i) What chemistry is needed for chemists and citizens? (ii) What balance should be sought between fact and theory in our curricula? (iii) How should we educate Teachers for a changing World? Emphasis will be given to Group Discussions.

It is hoped that plenary lectures will be given by the following educationists. Also given hereunder are names of discussion leaders (provisional):

| <i>Plenary Lecturers</i> | <i>Discussion Leaders</i> |
|---------------------------|---------------------------|
| Mr. BAJAH (Nigeria) | Dr. R. A. KULKARNI |
| Prof. GOMEL (France) | (India) |
| Mr. HITCHINS | VALERIE HEWETT |
| (New Zealand) | (Jamaica) |
| Prof. PADILLA (Mexico) | Prof. M. GARDNER (USA) |
| Mr. S. ANDERSSON (Sweden) | |
| Prof. D. BROWN (Ireland) | |

Intending participants are invited to submit a paper for poster sessions on topics being examined. The papers will be refereed. It is recognized that some participants may wish to present a talk on their paper and the local committee will attempt to give an opportunity for this, on an informal basis during the Conference.

Brief papers by selected participants on the National position on the three major topics of the symposium will be prepared beforehand. These participants will discuss the papers in groups, determined by the UNESCO regional boundaries, and then one of them will talk briefly about the position within his region at the time allocated for 'Regional Reviews on the Day's Topic'.

Correspondence

Enquiries and correspondence concerning the Conference should be addressed to: Mr. PETER A. START, Department of Chemistry, University College, Belfield, Dublin 4, Republic of Ireland. Tel: 693244 ext. 292, or 893242.

IV INTERNATIONAL IUPAC SYMPOSIUM ON MYCOTOXINS AND PHYCOTOXINS

Lausanne (Switzerland): 29–31 August 1979

The Fourth IUPAC Symposium on Mycotoxins and Phycotoxins, cosponsored by the World Health Organization and Swiss Society for Analytical and Applied Chemistry will be held in Lausanne (Switzerland) during 29–31 August 1979. Earlier symposia in this series were held in Göteborg, Sweden (1972); Pulawy, Poland (1974); Paris, France (1976). The Swiss Polytechnical School in Lausanne will function as host. Accommodation in hotels in Lausanne will be arranged through the Lausanne Tourist Board. Bus connection between Geneva airport and the hotel will be provided.

Scientific Programme

The aims of the Symposium will be:

- to acquire new information on mycotoxins
- to highlight the current concepts of the topic 'Mycotoxins and Food Safety'
- to extend the coverage to phycotoxins (algal toxins), compounds which may contaminate sea-foods

The following topics will be covered: (i) Natural occurrence of mycotoxins/phyco- toxins; (ii) Environmental factors influencing formation of mycotoxins/phyco- toxins; (iii) Fate of mycotoxins/phyco- toxins during food processing and storage; (iv) Toxic effects of mycotoxins/phyco- toxins; (v) Kinetics and mode of action of mycotoxins/phyco- toxins; (vi) Disease in man and animals causally associated with mycotoxins/phyco- toxins; (vii) Recent developments in the techniques for analysis and confirmation of mycotoxins/phyco- toxins; (viii) Biogenesis of mycotoxins/phyco- toxins; (ix) The chemistry of newly discovered mycotoxins/phyco- toxins; and (x) Round-table discussion: Mycotoxins and Food Safety.

Further information for presentation of papers will be announced towards the end of 1978 by the organizers whose names and addresses are given hereunder.

Correspondence

Enquiries and correspondence concerning the Symposium should be addressed to Prof. P. KROGH, Department of Veterinary Microbiology, School of Veterinary Medicine, Purdue University, West Lafayette, Indiana 47907, USA or Prof. D. REYMOND, Case postale 88, 1814 La Tour de Peilz, Switzerland.

IX INTERNATIONAL CONFERENCE ON ORGANOMETALLIC CHEMISTRY

Dijon (France): 3–7 September 1979

The Ninth International Conference on Organometallic Chemistry will be held at the University of Dijon (Facultés des Sciences Mirande). The Conference, sponsored by IUPAC, will be jointly organized by the Centre National de la Recherche Scientifique and the University of Dijon and will be held under the auspices of the Société Chimique de France and the Société de Chimie Industrielle. Earlier conferences in this series were held in Cincinnati (1963), Madison (1965), Munich (1967), Bristol (1969), Moscow (1971), Amherst (1973), Venice (1975) and Kyoto (1977). Accommodation for participants and those accompanying them will be available in hotels and in the university dormitories. The details of group flight plans from North America and Japan and reservations will be announced subsequently by the organizers. The official language of the Conference will be English.

Scientific Programme

Contributed papers concerning pure and applied organometallic chemistry (both main group elements

and transition metals) will be welcomed. Special emphasis will be laid on the following topics: (i) Structure and bonding; (ii) Stereochemical aspects; (iii) Synthesis and reaction mechanism; (iv) Organic synthesis via metal compounds; (v) Homogeneous catalysis; (vi) Photochemistry and photoactivation of organometallic compounds; (vii) Electrochemistry; (viii) Organometallic compounds with unusual properties; (ix) Organometallic polymers – Biological and Environmental Aspects.

The following scientists have agreed to present invited lectures at the Conference:

Opening Lecture

E. O. FISCHER (FRG): Transition Metal Carbyne Complexes

Plenary Lectures

E. C. ASHBY (USA): Title to be announced later

J. K. KOCHI (USA): Mechanistic Aspects of the Labilization of organometals; or Charge Transfer Processes and Paramagnetic Organometallic Intermediates

Section Lectures

H. ALPER (Canada): New Applications of Metal Carbonyls as Reagents and Catalysts in Synthesis

J. BARTON (USA): Reactive Intermediates in the Synthesis and Chemistry of Organosilacycles

C. P. CASEY (USA): Metal Formyl Complexes

C. P. CHIUSOLI (Italy): New Aspects of Organic Syntheses Catalyzed by VIII Group Metal Complexes

A. J. DEEMING (UK): Aliphatic C – H Bond Activation in Transition Metal Compounds

H. T. DIECK (FRG): Heterodiene-Transition Metal Chemistry: Synthetic, Structural and Catalytic Aspects

M. GIELEN (Belgium): Stereoselective Substitution Reactions at the Metal Atom of Optically Active Organotin Compounds

H. KAGAN (France): Some Aspects of Asymmetric Catalysis by Chiral Transition Metal Complexes

M. KUMADA (Japan): Nickel and Palladium Complex Catalyzed Cross-Coupling Reactions of Organometallic Reagents with Organic Halides

D. MANSUY (France): New Organometallic Complexes of Iron Porphyrins – Biological Implications

B. M. MIKHAILOV (USSR): The Chemistry of Boron-Cage Compounds

D. M. P. MINGOS (UK): Title to be announced later

S. OTSUKA (Japan): Dioxygen Activation–Dioxygenases and their Model Systems

R. SCHROCK (USA): Recent Advances in the Organometallic Chemistry of the Early Transition Metals

J. SCHWARTZ (USA): Organozirconium Compounds in Organic Synthesis

YU. T. STRUCHKOV (USSR): Title to be announced later

The invited lectures will be published in *Pure and Applied Chemistry*, the official journal of IUPAC. It is probable that a separate symposium volume will also be published by Pergamon Press, Oxford. Abstracts of papers intended for presentation should be sent to

the address given at the end of this announcement. Authors of selected contributed papers will be allowed 15 minutes (with additional 5 minutes for discussion) for presentation of their contribution. A poster session is also being organized which will run parallel with contributed papers for one day. A book of abstracts of all papers will be available to the participants at the Conference.

Correspondence

Enquiries and correspondence concerning the Conference should be addressed to: Prof. J. TIROUFLET, Chairman of the IXth ICOMC, Université de Dijon, Boîte Postale 138, F-21004 Dijon Cédex, France.

INTERNATIONAL CONFERENCE ON MÖSSBAUER SPECTROSCOPY

Portorož (Yugoslavia): 10–14 September 1979

The International Conference on Mössbauer Spectroscopy will be held in Portorož (Yugoslavia) during 10–14 September 1979. Earlier Conferences in this Series had been held in GDR (1971), Israel (1972), Czechoslovakia (1973), France (1974), Poland (1975), Greece (1976), Romania (1977), Japan (1978).

Scientific Programme

The scientific programme will comprise of main lectures and contributed papers. The following scientists have accepted invitations to deliver main lectures:

D. BARB (Romania): Ferroelectric and Magnetic Transition in Boracite.

I. DEZSI (Hungary): Mössbauer Studies of Defects – Review.

F. FITZSIMMONS (UK): Rotational Effect in Solids.

U. GONSER (FRG): Amorphous Metals, Spin Glasses.

N. N. GREENWOOD (UK): Composition of ^{99}Ru , ^{151}Eu Studied by Mössbauer Effect.

B. TRIPLETT (USA): Relaxation Phenomena and Mixed Valence States.

P. GÜTLICH (FRG): Review in Chemistry Applications.

C. JOHNSON (UK): Magnetism Review of One Dimensions.

H. DE WAARD (Netherlands): Study of Defects.

J. CHAPPERT (France): Muon Spectroscopy in Connection with Mössbauer Effect (tentative).

J. P. HANNON (USA): Methodology.

R. NUSSBAUM (USA): Orientations of Molecules on Surfaces.

V. G. BHIDE (India): Title not yet available.

V. I. GOLDANSKII (USSR): Title not yet available.

W. KUNDING (Switzerland): Closely Related Techniques.

D. MEISEL (GDR): Catalysis in Connection with Mössbauer Effect.

Correspondence

Enquiries and correspondence concerning the Conference should be addressed to: Dr. D. HANŽEL, J. Stefan Institute, University of Ljubljana, POB 199, 61001 Ljubljana, Yugoslavia.

SCOPE ICSU SCIENTIFIC COMMITTEE ON PROBLEMS OF THE ENVIRONMENT

As a direct contribution to enhancing the quality of life committees in IUPAC are currently working on such projects as microbial aspects of water quality, changes during deep fat frying, mycotoxin analytical standards, single cell proteins, chemicals in air and longterm effects, pollution abatement in industry, etc. Since some of the environmental problems are outside the scope of chemistry alone it was realized that international scientific unions representing other disciplines should cooperate to form a joint committee and in 1969 was witnessed the birth of SCOPE (Scientific Committee on Problems of the Environment of the International Council of Scientific Unions). The aims of SCOPE are: (i) to assemble, review and assess the information available on man-made environmental changes and the effects of these changes on man; (ii) to assess and evaluate the methodologies of measurement of environmental parameters; (iii) to provide an intelligence service on current research; and (iv) by the recruitment of the best available scientific information and constructive thinking to establish itself as a corpus of informed advice for the benefit of centres of fundamental research and of organizations and agencies operationally engaged in studies of the environment. The Secretariat of SCOPE is located at 51 Boulevard de Montmorency, Paris 75016, France with Dr. V. SMIRNYAGIN as its Executive Secretary.

IUPAC COMMITTEE ON SCOPE

IUPAC established in 1971 a Committee on SCOPE to (i) advise the President and the Executive Committee on the programmes and policies of SCOPE; (ii) carry out assignments agreed upon with SCOPE and to assist SCOPE generally in its activities. Dr. H. EGAN (Laboratory of the Government Chemist, London, UK) is the current Chairman of IUPAC's Committee and represents the Union on the ICSU Committee.

ACTIVITIES OF ICSU COMMITTEE ON SCOPE

July 1976–June 1978

Biogeochemical Cycles

This consists of subprojects on biogeochemical cycles of carbon, nitrogen and sulfur, and on biogeochemical cartography.

The National Committees of FRG, the Netherlands, and Sweden initiated a subproject on the study of the global carbon cycle which was also supported by SCOPE and Shell. An International workshop was held in Ratzeburg, FRG (March 1977) and was attended by 65 participants from 19 countries, including representatives from 8 developing countries. A report resulted from the workshop and will be published in the SCOPE Series as *The Global Carbon Cycle* in late 1978.

The biogeochemical cycling of carbon will remain a part of the SCOPE programme for the next three years and will be based mainly on two units. One unit is at the University of Hamburg and is concerned with the gathering, critical evaluation and dissemination of data. The second unit is located in Sweden, at the University of Stockholm and is mainly concerned with simulation modeling of the global cycle of carbon. Substantial support for these units has been received from Exxon. It is possible that a third unit, on biogeochemical cartography, will be established in Belgium with the support of the Belgian National Committee for SCOPE.

In February 1978, SCOPE sponsored, together with the International Institute for Applied Systems Analysis (IIASA) and WMO, an international conference on Carbon Dioxide, Climate and Society. The proceedings of this conference will be published by IIASA.

It was recognized during the first phase of the study that the biota play an important role in the global cycling of carbon, however, this role is difficult to evaluate because insufficient data are available. A SCOPE workshop on the Role of Terrestrial Vegetation in the Global Carbon Cycle will be organized in January 1979 by the US National Committee for SCOPE, to address this question.

Following an international workshop on the global biogeochemical cycles of N, P and S, held in Sweden (December 1975) the National Committees of Sweden and the USSR agreed to undertake a study, within the framework of SCOPE, on the cycles of nitrogen and sulfur respectively. These projects are financially supported by SCOPE, UNEP and Unesco and the respective National Committees. The objectives and work-plan were approved by the Executive Committee of SCOPE.

A SCOPE/UNEP International Nitrogen Unit was established at the Royal Swedish Academy of Sciences to study the nitrogen cycle. The first in the series of workshops dealing with nitrogen cycling will be held in December 1978 in Nigeria and devoted to the nitrogen cycle in West African ecosystems.

The Soviet and Swedish National Committees agreed to assume the responsibility for the study of the global sulfur cycle. A preparatory meeting was held in April 1978 where the work-plan was approved and an outline of the final report drafted. The major workshop is scheduled for February 1979.

Dynamic Changes and Evolution of Ecosystems

Phase 1 was terminated in 1976, with the publication of the report on *Dynamic Changes in Terrestrial Ecosystems* – a joint MAB/SCOPE publication. As a continuation of this project, the 'Ecological Effects of Fire' has been selected as an important area concerned with dynamic changes in ecosystems. A meeting of the Preparatory Committee was held in London (January 1977) under the chairmanship of Prof. R. SLATYER of Australia. An outline of the project was prepared and later approved by the Executive Committee. The main workshop will be held in late 1978. The Executive Committee also approved the organization of a circum-polar workshop on Fire in Tundra and Boreal Forest Ecosystems, which will be prepared by the Canadian National Committee for SCOPE.

The necessity for the launching of a new project on Land Conversion and Deterioration is now being explored. Also under consideration is the project on Dynamics of Ecosystems in Continental Water Bodies, proposed by the USSR National Committee.

Human Settlements

SCOPE completed Phase 1 of the project on Environmental Aspects of Human Settlements, with the publication of the report *Shelter Provision in Developing Countries*. This project was supported by UNEP and was of particular interest to developing countries. A study for the project was carried out by three collaborating institutions in Asia, Africa and Latin America. The working group has been dissolved.

Ecotoxicology

This project was aimed at developing a set of principles dealing with the assessment of the effects of noxious agents in the environment. The first Working Group meeting, supported by the European Economic Community, was held in Brussels in July 1976, where the outline of a report was discussed and approved. An international workshop in Ecotoxicology, financially supported by SCOPE and the Deutsche Forschungsgemeinschaft, was held in Munich (November 1976) at which the draft report was discussed. This was finalized during 1977 and will be published in 1978 under the title *Principles of Ecotoxicology* in the SCOPE series. This project also received financial support from the Rockefeller Foundation. With the completion of the report, the present Working Group on the project has been dissolved.

Following the open meeting of the SCOPE Executive Committee, held in London (October 1977) at which the importance of the continuation of this project was emphasized the organization was approved of a joint SCOPE/WHO preparatory meeting, held in Bellagio, Italy (June 1978). A proposal was made to establish an International Scientific Group on Methodologies for

the Evaluation of the Safety of Chemicals. The draft objectives and terms of reference of this group have been submitted to the Executive Committee for consideration.

Simulation Modeling

The mid-term project on Simulation Modeling of Environmental Problems was terminated with the publication of a report with the same title. The working group has been dissolved. It was decided that any further activity in this field should not have independent status, but should serve the needs of the rest of the SCOPE programme, especially that of biogeochemical cycles and dynamic changes and evolution of ecosystems.

As an example of such an integrated approach, SCOPE undertook the preparation of the Practitioner's Manual on the Modeling of Dynamic Changes in Ecosystems, supported by MAB of Unesco and by the Ford Foundation. The first draft of the main chapters of the Manual has been prepared and the main computer algorithms to be included in the book are currently being tested.

Activities in this field are also being continued by National Committees. For example, the USSR National Committee is organizing an International Seminar on Simulation Modeling of Some Specific Environmental Problems. This seminar will be held in the USSR in September 1978.

Groundwater Modeling

In 1976, the US Environmental Protection Agency, recognizing the importance of groundwater, granted a contract to SCOPE to investigate the status of numerical models as a tool in groundwater resource management. The report of this study, which was carried out at the Holcomb Research Institute of Butler University, Indianapolis, USA, will be published in 1978.

Environmental Monitoring

In 1975 SCOPE established the Monitoring Assessment and Research Centre (MARC) at Chelsea College, University of London, UK, with the support of UNEP, the Rockefeller Foundation and the United Kingdom Department of the Environment. The work of MARC has been concentrated on the following research themes: the Dose-Commitment Model; Time Perspective of Environmental Change; Regional Monitoring Needs.

A training course entitled 'Environmental Pollution Monitoring and Control' was held in May/June 1977. This course was funded substantially through MARC, and the Centre played a major role in its design and organization. The 17 participants were drawn from a number of developing countries in Africa and Asia.

Since April 1978, MARC has become a UNEP operational centre, financially supported by UNEP, the Rockefeller Foundation and Chelsea College. SCOPE now provides scientific advice to MARC through its Scientific Advisory Committee.

Environmental Risk Assessment

SCOPE, with the support of UNEP, has undertaken a study of environmental risk assessments, methods and procedures, in an international context. The first phase of this project has been completed and a report entitled *Risk Assessment of Environmental Hazard* has been published by Wiley.

Phase 2 of the project is now in the process of completion. Its aim is to provide decision-makers, especially in developing countries, with practical guidance on the evaluation of risks in the environment.

An international working seminar on this subject was held in Tihany, Hungary, during 8–14 June 1977. It was attended by 30 participants from 12 countries, including representatives from 7 developing countries, UNEP and other organizations. The Seminar was financially supported by the Hungarian Academy of Sciences and UNEP. The report of this seminar, entitled 'Risk Management: An International Perspective' has now been completed and will be published in the SCOPE series.

Arid Land Irrigation

A Working Group of SCOPE met immediately after the COWAR Symposium on Arid Land Irrigation in Developing Countries at Alexandria in February 1976 and prepared a report on the Main Effects and Problems of Irrigation. This report will be published as a joint MAB/SCOPE publication.

Ozone Layer

In 1976, in response to a request from UNEP, ICSU designated SCOPE to prepare a state-of-the-art report on the ozone layer. This was a truly inter-disciplinary effort, involving contributions from a number of ICSU Unions and Committees. The report was submitted to an international meeting of experts on the ozone layer problem, organized by UNEP and held in Washington, DC, March 1977.

Saharan Dust Transport

A Workshop, organized jointly by SCOPE, the Swedish National Sciences Research Council and the Swedish National Committee for SCOPE and supported financially by UNEP and MAB/Unesco, was held in Gothenburg, Sweden, in April 1977. Twenty-six scientists, representing different disciplines in natural science, from Africa, Europe and North America participated in this Workshop.

As a basis for the discussions during the workshop, about twenty papers were presented by international experts, covering a wide variety of inter-disciplinary topics relevant to the field. The workshop reviewed the present state-of-the-art and gave recommendations for future research and monitoring concerning mobilization, transport and deposition of airborne Saharan soil and dust and the ecological implications. The report will be published by Wiley in the SCOPE series in 1978.

Cooperation and Collaboration with Other Organizations

Fifteen ICSU Unions and Committees participate in SCOPE activities. More close collaboration in the fields of biogeochemical cycles and ecotoxicology is envisaged with IUPAC which has established a special committee on SCOPE.

Outside the ICSU family, SCOPE works in close cooperation with many inter-governmental organizations: especially close relationships have been developed with UNEP and MAB/Unesco.

Fruitful cooperation also exists with the Ford Foundation and the Rockefeller Foundation, which support a number of the SCOPE scientific projects.

Publications

In 1977, SCOPE signed an agreement with John Wiley & Sons, Ltd., for the publication of SCOPE material and its distribution. During the reported period, the following SCOPE Reports have either been published, or are currently in press.

- 8: Risk Assessment of Environmental Hazard – R. W. KATES (1978)
- 9: Simulation Modeling of Environmental Problems Editors: F. N. FRENKIEL and D. W. GOODALL (1978).
- 10: Environmental Issues. Editors: M. W. HOLDGATE and G. W. WHITE (1977).
- 11: Shelter Provisions in Developing Countries by A. L. MABOGUNJE, H. E. HARDOY and R. P. MISRA. Editor: C. I. JACKSON (1978).
- 12: Principles of Ecotoxicology (in press)
- 13: The Global Carbon Cycle (in press)
- 14: Aeolian Dust Transport (in press)

Earlier SCOPE Reports are listed hereunder:

- 1: Global Environmental Monitoring – A Report submitted to UN Conference on the Human Environment: Stockholm (1972)
- 2: Man-made Lakes as Modified Ecosystems (1972)
- 3: Global Environmental Monitoring System – Action Plan for Phase I by R. E. MUNN (1973)
- 4: Environmental Sciences in Developing Countries – Summary Reports and Recommendations from SCOPE/UNEP Symposium on Environmental Sciences in Developing Countries, Nairobi, February 1974, Editor: D. M. DWORKIN (1974)
- 5: Environmental Impact Assessment – Principles and Procedures. Editor: R. E. MUNN (1975)
- 6: Environmental Pollutants – Selected Analytical Methods. Compiled by W. GALLAY, H. EGAN, J. L. MONKMAN, R. TRUHAUT, P. W. WEST and G. WIDMARK. Published by Butterworths, London (1975)
- 7: Nitrogen, Phosphorus and Sulfur – Global Cycles. Editors: B. H. SVENSSON and R. SÖDERLUND. Published as *Ecological Bulletin* No. 22 by Swedish National Science Research Council, NFR (1976)

In addition, two MAB Technical Notes have been published jointly by MAB and SCOPE:

- 4: Dynamic Changes in Terrestrial Ecosystems
- 5: Guidelines for Field Studies in Environmental Perception.

CODATA ICSU COMMITTEE ON DATA FOR SCIENCE AND TECHNOLOGY

To meet with the need for compilation of critically evaluated numerical and other scientific data on an international, interdisciplinary basis, the International Council of Scientific Unions established in 1966 the Committee on Data for Science and Technology which has since become well known as CODATA. The CODATA Secretariat is located at 51 Boulevard de Montmorency, F-75016 Paris, France with Mr. B. DREYFUS as its Executive Secretary. The tasks assigned to CODATA are:

- (a) to ascertain on a worldwide basis through the appropriate Unions and national bodies: (i) what work on critical compilation of evaluated numerical data is being carried on in each country; (ii) what work is being sponsored by each Scientific Union or by other international groups; and (iii) what the needs of science and industry are for additional compilations of evaluated data.
- (b) to achieve coordination among, and strengthening of, existing programs in such a way as to maximize their effectiveness, to minimize unintentional or undesirable overlap, and to recommend new compilation programs when necessary.
- (c) to encourage the support of needed work by appropriate private, governmental and intergovernmental agencies.
- (d) to encourage the use of nomenclature, symbols, and constants advocated by the responsible Unions; and, when desirable, uniform editorial policy and procedures for presentation of information.
- (e) on a worldwide basis: (i) to stimulate wider distribution of compilations of high quality; (ii) to maintain and distribute a directory of continuing data compilation projects and related publications; and (iii) to encourage adequate indexing of the substances and properties covered by all such compendia.
- (f) to encourage and coordinate research on new methods for the preparation and dissemination of critically evaluated tables generally expressed in numerical form.

IUPAC and CODATA

IUPAC can justly claim to have played a major role in the establishment as well as development of CODATA through its Members: R. N. JONES, W. KLEMM, F. D. ROSSINI, S. SUNNER, B. VODAR, G. WADDINGTON, E. F. WESTRUM, JR. and many others. Dr. R. N. JONES

(National Research Council, Ottawa, Canada) is the current IUPAC representative on CODATA.

After publishing several books on data and critically evaluated data compilations over several years, IUPAC itself launched in 1976 a new series under the general title 'IUPAC Chemical Data Series' (available from Pergamon Press, Oxford). Already 15 or so titles have been published; a list of those published in 1977 has been included in *IUPAC Inf. Bull.* (1978), No. 1, p. 65. It is appropriate to mention here also some IUPAC multi-volume works such as International Thermodynamic Tables of the Fluid State, Stability Constants, Dissociation Constants, and Equilibrium Constants; in addition the first volumes of 'Solubility Data' will start to appear in 1979.

ACTIVITIES OF CODATA

June 1977–June 1978

The report of CODATA for the period June 1977 to June 1978 prepared by its Secretary General Prof. E. F. WESTRUM, JR., is presented hereunder.

6th International CODATA Conference

The 6th International CODATA Conference was held during 22–25 May 1978 in Santa Flavia, near Palermo, Sicily, Italy. There were 180 participants from 20 countries. While the Conference covered practically all aspects of work on data, there was particular emphasis on data relevant to the prediction of natural hazards, to the prevention of man-made hazards, and, more generally, to the improvement of the quality of life. During the General Assembly, which took place after the Conference, Prof. M. KOTANI was elected as President of CODATA in succession to Prof. MELCHIOR.

Training Courses on Handling of Experimental Data

Three one-week international training courses on the Handling of Experimental Data were held in Poznan, Poland, 5–24 September 1977, in collaboration with the Polish Academy of Sciences and with the financial support of Unesco/GIP (General Information Programme). One course each was devoted to: Biological Data, Engineering Data, Physics and Chemistry Data respectively, each with about 30 participants. They came from 10 countries, with Poland providing by far the largest contingent. The lecturers were from Poland and the USA.

Data Evaluation and Dissemination through Task Groups

CODATA's 12 Task Groups have pursued their activities partly by correspondence, and partly through meetings. Some of them have completed their tasks and have been, or will shortly be, discontinued. The following selection will give an idea of the range of interests:

(a) *Key values for Thermodynamics*. This Task Group has been in existence for 10 years and when it has completed its work, by the end of 1978, its final report (to be published as a *CODATA Bulletin* in 1979) will list recommended values for almost 150 chemical species. It will then be disbanded, but some of its work will be continued by new Task Groups on Internationalization and Systematization of Thermodynamic Data.

(b) *The Task Group on Chemical Kinetics* has set itself a much narrower task of great topical interest. It will produce a list of recommended rate constants and photochemical parameters for atmospheric reactions and, to support the above list, will publish datasheets on the relevant reactions. Only neutral reactions occurring in the stratosphere and the natural, unpolluted troposphere are to be considered. The Task Group hopes to complete its work and issue its final report by the end of 1980.

(c) *The Task Group on Space and Time Dependent Data* is engaged in a truly interdisciplinary activity, having as its broad aim to improve the transfer between disciplines of the methodology of handling such data, and to stimulate fundamental and applied research in handling techniques. Ten working groups covering individual disciplines have been established so far. It is hoped that their reports will be issued early in 1979, and that the final report could be published during the first half of 1980.

(d) *The Task Group on Presentation of Biological Data in the Primary Literature* has completed its work and its report was published as a *CODATA Bulletin*.

(e) The two main concerns of the *Task Group on the Accessibility and Dissemination of Data* were the setting up of the World Data Referral Centre (WDRC) [see *IUPAC Inf. Bull.* No. 54 (December 1977), pp. 116–117] and the completion of the 'Source Books' on Data, which will be published in 1979 in book form under the title *Data Handling for Science and Technology – A Survey and Source Book*.

In September 1977 an information specialist was appointed for the World Data Referral Centre (WDRC) which, however, continues to be part of CODATA, since lack of longterm substantial and not ear-marked funding makes its establishment as an independent organization impracticable. For the same reason it is mainly concerned with helping existing Referral Centres by the preparation of Data Referral Catalogues on Books and Tables, on Experts and on Data Centres, while the actual data referral service has lower priority. WDRC is at present funded through contracts from Unesco/GIP and by CODATA.

Publications

(a) *Proceedings of the 5th CODATA Conference* (Boulder, Colorado: 28 June–1 July 1976) appeared in July 1977. The publication contains over 100 articles, with about 600 pages (over 600 000 words), and is fully indexed.

(b) *CODATA Bulletins* issued during the last 12 months are listed hereunder:

24 (June 1977): CODATA Directory of Data Sources for Science and Technology. Chapter 1: Crystallography

25 (November 1977): Biologists' Guide for Presentation of Numerical Data in the Primary Literature

26 (January 1978): International Training Courses in the Handling of Experimental Data

27 (March 1978): Abstracts—6th International CODATA Conference

28 (April 1978): CODATA Recommended Key Values for Thermodynamics 1977

CODATA Bulletins published earlier are listed hereunder:

1 (October 1969): Automated Information Handling in Data Centers. Report of the ICSU-CODATA Task Group in Computer Use, June 1969

2 (November 1970): Tentative Set of Key Values for Thermodynamics—Part I. Report of the ICSU-CODATA Task Group on Key Values for Thermodynamics, October 1970

3 (December 1971): A Catalog of Compilation and Data Evaluation Activities in Chemical Kinetics, Photochemistry and Radiation Chemistry. Report of the CODATA Task Group on Data for Chemical Kinetics, September 1971

4 (December 1971): Automated Information Handling in Data Centers (Second Edition). Report of the CODATA Task Group on Computer Use, November 1971

5 (December 1971): Final Set of Key Values for Thermodynamics—Part I. Report of the CODATA Task Group on Key Values for Thermodynamics, November 1971

6 (December 1971): Tentative Set of Key Values for Thermodynamics—Part II. Report of the CODATA Task Group on Key Values for Thermodynamics, November 1971

7 (August 1972): Tentative Set of Key Values for Thermodynamics—Part III. Report of the CODATA Task Group on Key Values for Thermodynamics, June 1972

8 (November 1972): Geological Data Files—Survey of International Activity. Report of COGEODATA Committee on Storage, Automatic Processing and Retrieval of Geological Data of the International Union of Geological Sciences (IUGS)

9 (December 1973): Guide for the Presentation in the Primary Literature of Numerical Data Derived from Experiments. Report of the CODATA Task Group on Publication of Data in the Primary Literature, September 1973

10 (December 1973): CODATA Recommended Key Values for Thermodynamics, 1973. Report of the CODATA Task Group on Key Values for Thermodynamics, November 1973

11 (December 1973): Recommended Consistent Values of the Fundamental Physical Constants, 1973. Report of the CODATA Task Group on Fundamental Constants, August 1973

12 (September 1974): Energy Data – Accessing and/or Retrieval. A Report of the Working Panel on Data Tagging Convened at the Energy Research and Development Data Workshop held 6–7 May 1974 at the National Bureau of Standards, Gaithersburg, Maryland, USA

13 (December 1974): The Presentation of Chemical Kinetics Data in the Primary Literature. Report of the CODATA Task Group on Data for Chemical Kinetics

14 (June 1974): Proceedings of the Fourth International CODATA Conference on Generation, Compilation, Evaluation and Dissemination of Data for Science and Technology (Tsakhkadzor, USSR, 24–27 June 1974)

15 (March 1975): Man–Machine Communication in Scientific Data Handling. A Symposium held in Freiburg im Breisgau, FRG on 22–25 July 1973 under the sponsorship of the CODATA Task Group on Computer Use

16 (October 1975): Study on the Problems of Accessibility and Dissemination of Data for Science and Technology. Report of the CODATA Task Group on Accessibility and Dissemination of Data

17 (January 1976): CODATA Recommended Key Values for Thermodynamics 1975. Report of the CODATA Task Group on Key Values for Thermodynamics

18 (April 1976): Abstracts – 5th International CODATA Conference (Boulder, Colorado, USA, 28 June–1 July 1976)

19 (June 1976): Flagging and Tagging Data – To Indicate Its Presence and Facilitate Its Retrieval. Report of the ICSU AB/CODATA Joint Working Group on Tagging and Flagging

20 (September 1976): Recommendations for Measurement and Presentation of Biochemical Equilibrium Data. Report of the ICSU Interunion Commission on Biothermodynamics

21 (October 1976): Proceedings of the Plenary Sessions – Fifth International CODATA Conference on Generation, Compilation, Evaluation and Dissemination of Data for Science and Technology (Boulder, Colorado, USA, 28 June–1 July 1976)

22 (March 1977): CODATA Recommended Key Values for Thermodynamics 1976. Report of the CODATA Task Group on Key Values for Thermodynamics

23 (May 1977): Selected Papers Relevant to Energy presented at the 5th International CODATA Conference (Boulder, Colorado, USA, June 1976)

(c) In addition, four *Special Reports* have been issued:

4: Tentative Set of Key Values for Thermodynamics – Part VI

5: CODATA's Long-Term Program (March 1978 Revision)

6: CODATA/UNESCO-UNISIST/Polish Academy of Sciences – International Training Courses in the Handling of Experimental Data

7: Tentative Set of Key Values for Thermodynamics – Part VII

(d) One CODATA *Newsletter* (No. 18: September 1977) was published during the period of this Report.

1979 CHANGES

In conjunction with the appointment of the IUPAC Information Officer (see following page), the *Information Bulletin* in 1979 will be devoted entirely to news about IUPAC activities, whereas all recommendations on nomenclature and symbols and other technical reports issued by the Union, whether provisional or definitive, will be found in the journal *Pure and Applied Chemistry*. One of the tasks of the Information Officer will be to alert readers of the Bulletin to the material in *PAC*.

NEW IUPAC INFORMATION OFFICER

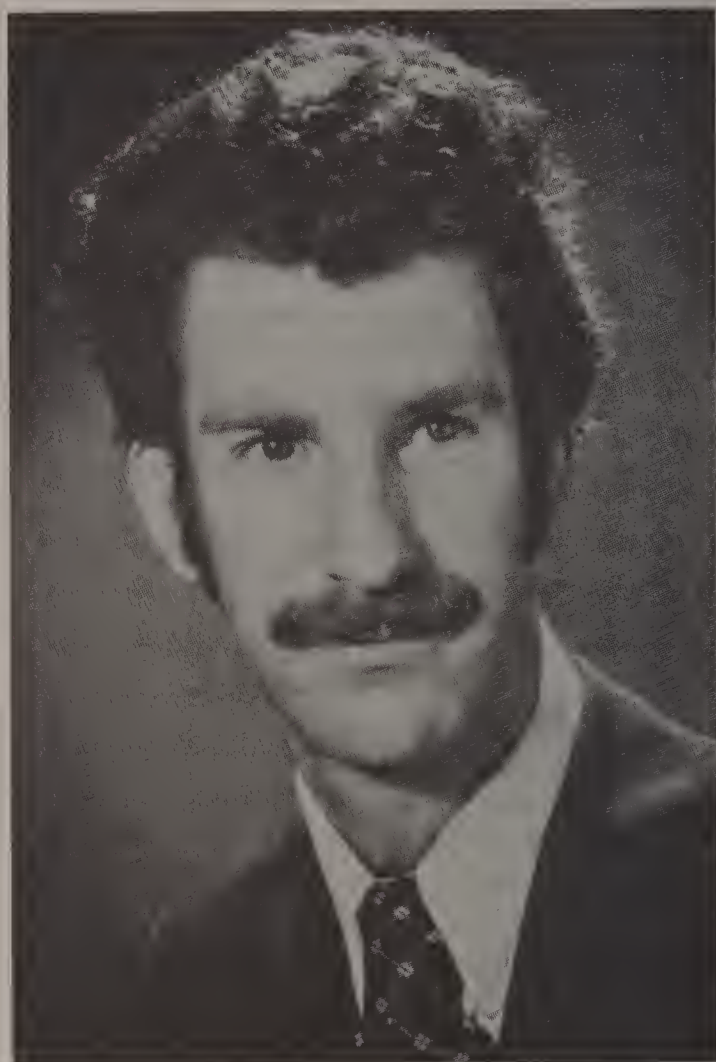
The extensive work of chemists from all over the world on IUPAC committees led to a continuous flow of scientific information which, over the years, covered ever wider aspects of chemistry. The scope of IUPAC publications became so diverse that it was sometimes difficult, even for those directly responsible, to know where a particular document was to be found.

In 1976 the following was agreed as a better publications structure for the future:

1. *Pure and Applied Chemistry (PAC)* to continue as a journal, but confined to review papers and still based on plenary lectures at IUPAC-sponsored symposia.
2. The *Information Bulletin* to be reshaped into an IUPAC News Bulletin, with journal character and appearing at regular intervals; to contain nomenclature recommendations and other commission reports presently issued in *PAC*, material currently issued as Appendixes to the *Information Bulletin*, and all relevant material from the present Bulletin and *Comptes Rendus IUPAC General Assemblies (Conferences)*. The *Comptes Rendus* should be discontinued.
3. Monographs, to include material presently issued separately from *PAC*, under the title *IUPAC Chemical Reference Books*.
4. Data, numerical or otherwise, under the title *IUPAC Chemical Data Series*.

Starting in 1977, all material in *PAC* has been printed directly from camera-ready copy supplied by authors. In a further attempt to reduce delays in publication, it has been decided to publish lectures from a particular symposium as soon as each one becomes available rather than all together in the same issue of the journal. All lectures will, however, continue to appear together subsequently in a hardbound reprint from *PAC*. For the time being at least, final nomenclature recommendations and other commission reports are being retained in the journal.

The *Information Bulletin* this year has been consolidated and now serves, unified, as a means of presenting the various activities of the Union and other interesting material to the world community of chemists. The Appendixes to the Bulletin and the *Comptes Rendus* have been discontinued. As a further step towards an improved dissemination of news about the multitude of its activities, IUPAC is pleased to announce the full-time appointment of Dr. MARTIN GELLENDER as editor and information officer of the Union from 1 December 1978.



Dr. GELLENDER received his Ph.D. in physical chemistry—the energy analysis of electron beams—from the City University of New York in February 1976. Subsequently he took a temporary teaching position at Scarborough College (University of Toronto). For the past year he has been able to exploit his interest in technical writing as an assistant editor of the *Canadian Chemical Processing*. Dr. GELLENDER will be working full-time from the IUPAC Secretariat at Oxford.

Mr. P. D. GUJRAL, who has been for several years Assistant Secretary (Publications) in the IUPAC Secretariat, will continue to be responsible for publications other than the Bulletin. As in 1978, Dr. H. GRÜNEWALD will next year act as Scientific Editor of *PAC*.

PROVISIONAL

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

ANALYTICAL CHEMISTRY DIVISION COMMISSION ON EQUILIBRIUM DATA

PROPOSED SYMBOLS FOR METAL COMPLEX MIXED LIGAND EQUILIBRIA

Prepared for Publication by
G. H. NANCOLLAS and D. N. HUME

Comments on these proposals should be sent within 8 months of Publication to the Secretary of the Commission:

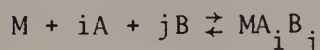
Prof. S. AHRLAND
Department of Inorganic and Physical Chemistry
Chemical Center, University of Lund
POB 740, S-220 07 Lund 7
Sweden

Comments from the viewpoint of languages other than English are encouraged. These may have special significance regarding the eventual publication in various countries of translations of the nomenclature finally approved by IUPAC.

The formation of mononuclear metal complexes in solution can be described in terms of consecutive or cumulative equilibrium constants. The symbols which are used, K_n and β_n respectively, are perfectly adequate to describe these simple reactions. Recently, however, there has been a resurgence of interest and activity in complexing systems containing more than one type of ligand molecule coordinated to a metal ion. Such reactions can be written in a variety of ways depending upon the type of comparative data to be presented by a particular author. So many different symbols and combinations of symbols have been used to describe individual systems that it is most desirable to establish a universally acceptable and workable scheme.

In the following, four groups of reactions are given, into which most experimental systems of interest can be placed. The approach we have taken is to indicate the reactant composition by subscripts to the left of K and the product composition by subscripts to the right of K. (M = metal ion, A and B are different ligands; charges are omitted for clarity).

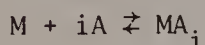
1. OVERALL STABILITY CONSTANT



$$i + j \leq N \text{ (coordination number)}$$

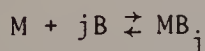
recommended symbol β_{ij}

a) $i \neq 0 \quad j = 0$



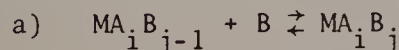
recommended symbol β_{i0}

b) $i = 0 \quad j \neq 0$

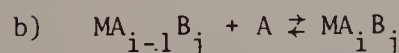


recommended symbol β_{0j}

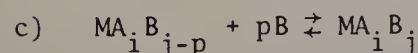
2. ADDITION REACTIONS



recommended symbol ${}_{i,j-1}K_{ij}$

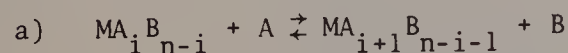


recommended symbol ${}_{i-1,j}K_{ij}$



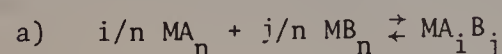
recommended symbol ${}_{i,j-p}K_{ij}$

3. SUBSTITUTION REACTIONS



recommended symbol ${}_{i,n-1}K_{i+1,n-i-1}$

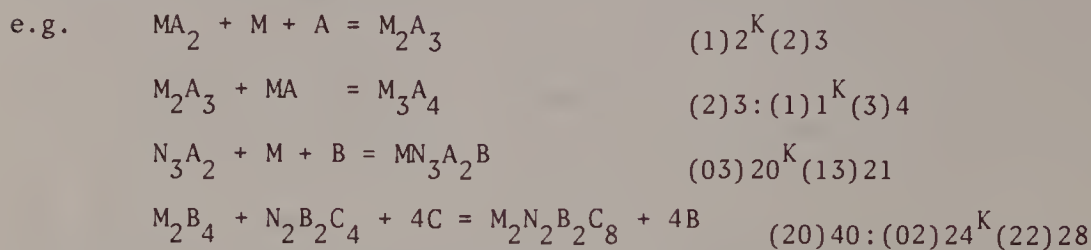
4. COPROPORTIONATION REACTIONS



recommended symbol ${}_{no:on}K_{ij}$

5. POLYNUCLEAR COMPLEXES

For equilibria involving polynuclear complexes, the number of metal atoms of each kind will be indicated in parentheses immediately preceding the ligand numbers. Alphabetical ordering will be used in each case.

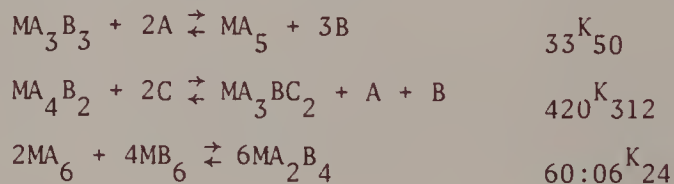


For the overall stability constants of the species formed in the above reactions, the constants would be simply

$$\beta_{(2)3}, \beta_{(3)4}, \beta_{(13)21} \text{ and } \beta_{(22)28} \text{ respectively.}$$

Should equilibria ever involve ten or more units of any reactive species, commas will be necessary in the subscripts to avoid any possibility of confusion.

The K symbols, although rather formidable expressed in general terms, become quite simple in specific instances. For example:



PROVISIONAL

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

CLINICAL CHEMISTRY SECTION COMMISSION ON AUTOMATION*

CHARACTERISTICS AND ATTRIBUTES OF INSTRUMENTS INTENDED FOR AUTOMATED ANALYSIS IN CLINICAL CHEMISTRY[†]

Comments on these proposals should be sent within 8 months of Publication to the Acting Chairman of the Commission:

Prof. M. HJELM
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University Hospital
DK-5000 Odense, Denmark

Comments from the viewpoint of languages other than English are encouraged. These may have special significance regarding the eventual publication in various countries of translations of the nomenclature finally approved by IUPAC.

*Titular Members: M. HJELM (Acting Chairman), J. BIERENS DE HAAN, J. BUTTNER, D. S. YOUNG.
Associate Member: T. P. WHITEHEAD

[†] Camera-ready manuscript was prepared by J. BIERENS DE HAAN and M. ROTH

CHARACTERISTICS AND ATTRIBUTES OF INSTRUMENTS INTENDED FOR AUTOMATED
ANALYSIS IN CLINICAL CHEMISTRY

PREFACE

Mechanized systems of analysis began to be used widely in clinical chemistry laboratories in the 1960s. Their introduction met a long felt need for increasing the output of such laboratories which in turn was due to the increased use of chemical analyses in the diagnosis and treatment of disease.

The design of suitable instruments required certain compromises in the analytical methods used and many clinical chemists were concerned that convenience in design of commercial instruments might determine the choice of methods.

In addition, instruments already in use had important defects, e.g. :

- they could not "read" specimen identifications,
- they required more serum than desirable,
- they were subject to drift and noise,
- their analytical data were imprecise with certain methods,
- they were unsuitable for emergency analyses,
- they led to contamination between specimens and/or samples.

Clinical chemists were anxious to express their views on such matters and state their requirements. This is the background of the present document.

Incorporating all the suggested attributes in one instrument is probably not feasible. Nevertheless, the Commission thought it important to describe the ideals which should be striven for by those designing and building such equipment. Also, the document may be useful to potential users.

The document has been shown to others and some have commented that it states the obvious but unattainable. The Commission has been comforted by the fact that, in the meantime, instruments involving many of the listed attributes that were at one time regarded as unattainable, have now been marketed. It is because of such developments in technology that the Commission has resisted writing minimum specifications for such factors as precision, volume of serum used, etc.

As a result of comment by other readers, it may not be superfluous to point out that many of the apparently simple statements in this document have far reaching implications and that these are worthy of careful consideration.

The glossary of terms is not meant to be complete but is a list of those terms used in the document which required formal definition.

1. INTRODUCTION

1.1 Instruments for automated analysis are needed in clinical chemistry to reduce manual work, increase the productivity of laboratory staff, improve the quality of results and, thereby, enhance the contribution of clinical chemistry to the improvement of patient care.

1.2 Desirable characteristics of instruments intended for automated analysis in clinical chemistry are described in this document.

1.3 The described attributes are most appropriate to instruments in which a biological fluid specimen such as blood, urine, cerebrospinal fluid or amniotic fluid is subjected to automated analysis. This document is not concerned with those measuring or detection instruments which are attached to a patient or with those instruments intended to process solid material such as faeces, calculi or material taken by biopsy.

1.4 Many of the terms used are defined in the Glossary.

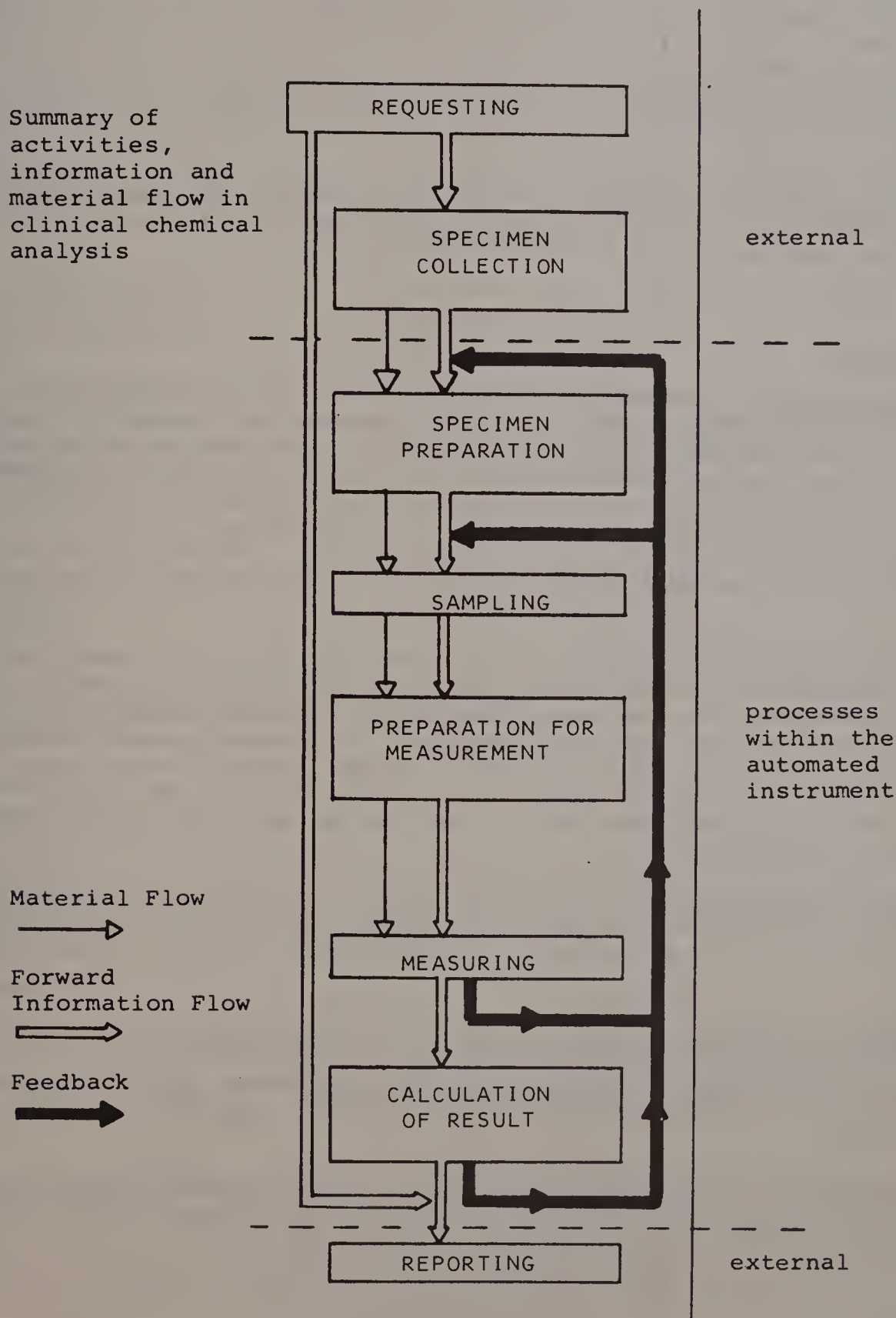
1.5 Although the term "patient" is used throughout this document, the term "individual" would be more appropriate when the processes described are concerned with the detection of pre-symptomatic disease.

2. PROCESSES INVOLVED IN CLINICAL CHEMICAL ANALYSIS

2.1 The diagram summarizes the processes in clinical chemical analysis. Those from specimen preparation to calculation of result are the province of the automated analytical instrument. The processes before specimen preparation and after calculation of results are envisaged as being external to the instrument. Both material and information must be transported through the instrument.

2.2 In clinical laboratory investigation the requesting procedures used are diverse and dependent upon local conditions and traditions. No instrument should be so rigid in design that it necessitates major alterations of these procedures. Therefore, the starting point of these recommendations is a specimen on which requests are made.

Summary of activities, information and material flow in clinical chemical analysis



3. SPECIMEN IDENTIFICATION AND PRESENTATION

3.1 As described earlier in this document, several aspects of data handling such as patient identification at the time of specimen collection are external to the instrument. However, at the time of presentation of the specimen to the instrument the identification of the specimen must be unequivocal. The form and contents of this identification should be the choice of the user (e.g. in its simplest form a laboratory accession number) and must be in human and instrument-readable form and physically linked to the specimen. If a particular result makes it necessary to perform further analyses, (see 4.3) additional information may have to be carried in the specimen identification.

3.2 Specimen preparation : Specimen preparation should be considered an integral part of the analytical process. Common preparation techniques include separation of blood plasma from cells, mixing of sediment or supernate, etc., as appropriate, according to the specimen specifications.

3.3 Status of specimen : Physical or chemical abnormalities of the specimen, e.g. hyperbilirubinaemia, haemolysis, and lipaemia, need to be detected and recorded and associated with the result that is produced. If the status of the specimen is such that the result would be invalid, analysis or the production of a report should be prevented. Such detection, discrimination or rejection should be automated and programmable for each determination.

3.4 Storage within the instrument : Between the presentation and sampling steps, the specimen should be stored under conditions which prevent changes in its composition. This includes storage prior to repeated determinations (see 4.3).

4. SAMPLING

4.1 Sample size : The required volume of sample should be small and adjustable according to the analytical procedure. For a given determination, the same analytical procedure, and thus sample volume, should be used for specimens from infants and adults. However, collection procedures could be different for infants and adults. For example, the collection of blood from infants may involve capillary specimens and for adults collection by venipuncture, but there would be a common analytical pathway.

The sample volume should be small enough to allow even multiple analyses on specimens from infants.

4.2 Selection of determinations : The instrument should be able to accept specimens of different biological fluids, from a loading zone of sufficient capacity to meet the laboratory's requirements. The instrument should be able to sample specimens (e.g. whole blood), or prepared specimens (e.g. plasma or serum). The instrument should perform only the tests requested and consume only the volume of sample required for those tests. However, an automated instrument could initiate additional determinations with minimum use of specimen, reagents and instrument capacity, depending on the results obtained with the initially requested determinations.

4.3 Repeated determinations : Part of the specimen should be retained in the instrument so that determinations may be repeated, particularly if a reading was found to be outside the predefined limits for the method. Identification of the sample must remain unequivocal.

4.4 Emergency determinations : At any time it should be possible for the instrument operator to interpose specimens, single or multiple, for emergency determinations. Again specimen identification should be unequivocal. By implication that the instrument can be used for emergency determinations it must be simple to operate, and have both short start-up and analysis times.

4.5 Contamination : Contamination resulting from contact between specimens, samples and/or reagents must not occur. The problem should be solved by instrument design and not by means of computation.

5. PREPARATION FOR MEASUREMENT

5.1 The automated instrument must at least be capable of performing generally accepted chemical or physical methods of analysis, currently used in clinical chemistry. Such instrument design implies the provision of a transport system for specimen and sample to the appropriate devices required for the analytical processes, e.g. addition of reagents, mixing, heating and separation of solutions. Such processes are followed by a detection or measuring step, e.g. for absorption, emission, fluorescence, electrode potential, conductivity, mass, etc.

Poor analytical methods or sub-optimal conditions should not be used for the convenience of instrument design. The frequency of calibration of the instrument is dependent upon the stability, or lack of stability, of the instrumental, reagent and specimen factors involved in the analytical processes. Infrequent calibration is an important attribute of automated instruments, but provision for re-calibration at any time should be included. Each part of the analytical process, (e.g. the sampling and measuring steps) as well as the entire procedure, should be capable of being checked for such reliability factors as precision and accuracy. Variations occurring during preparation for measurement contribute to the overall variability, particularly when chemical reactions are involved without adequate control of such conditions as temperature, light and mixing. The control of these conditions is an essential aspect of instrument design.

5.2 Monitoring of functions : As many functions of the instrument as possible, starting with specimen handling, should be automated, i.e. self-monitoring and self-adjusting. When controlled variables such as transducer output or temperature exceed prescribed limits, or in the case of a mechanical or electrical dysfunction, an alarm system should operate. This system must stop the instrument in a way that avoids the production of erroneous results, damage to the instrument, loss of valid results and loss of specimens. It must provide informative error messages to the operator.

5.3 Noise and drift : The instrument should function essentially without electronic or chemical noise or drift. Full information concerning drift correction, when this took place, should be readily available to the operator.

5.4 Chemical reagents : The need for users to prepare their own reagents and check those supplied by commercial sources must be considered by manufacturers in the design of their instruments. If it is necessary for manufacturers to supply reagents for their instruments, composition and specifications of these reagents must be stated.

Drifts due to reagent deterioration should be prevented by the storage of reagents under conditions which ensure chemical stability. The minimum volume of a reagent required for correct operation of the instrument should be of the order of that required for a single determination. In this way reagent consumption can be kept small when few analyses have to be performed.

5.5 Simulation of the analytical procedure : If feasible, all steps of a procedure should be specified to a degree that enables them to be carried out or simulated elsewhere for programming and checking purposes.

6. MEASUREMENT AND CALCULATION

6.1 The instrument used in the measuring step of the analytical method should have defined characteristics and provide accurate and precise physical measurements of the component. It should be noted that some kinds of quantities (e.g. enzyme activity), have to be measured by definition under prescribed conditions.

Where appropriate, facilities for independent physical measurement should be provided thus avoiding repeated standardization and calibration. The sensitivity of the transducer must be sufficient to allow accurate and precise results over the range of values expected.

6.2 Temperature control : Temperature variations during measurement should be controlled within narrow specified limits.

6.3 Output of results : The instrument output of results should be available in digital form and only meaningful figures reported. The result must be associated with the specimen identification, either directly or through a laboratory accession number. Also available to the operator should be messages concerning the state of the specimen. The same data should be in appropriate form for transmission to an external computer. Data output from the instrument to a visual display unit should be possible.

6.4 Output of reports : Results must be associated with specimen identification, patient specifications and requesting source before a report is produced. Additional information such as quality control data, plausibility checks and reference values may be necessary for correct editing of a result. This may be accomplished either within the instrument or in an external data processing system.

The user should be able to specify the make-up, format and size of the report.

7. ACCURACY AND PRECISION

In general the accuracy, precision and specificity of present methods in clinical chemistry are inadequate and should be improved.

No specific figures can be recommended but the introduction of new instruments should improve the situation and not compromise on accuracy, precision or specificity for instrument design convenience.

8. SAFETY

The instrument should not create safety hazards. Such hazards not only include the obvious ones such as acoustical, electrical, mechanical or chemical hazards but also the spread of infection by biological agents.

9. ENVIRONMENTAL PROTECTION

The environment should not be endangered by the dispersal of waste from an instrument and this must be an important consideration in the design and use of the instrument.

10. PROTECTION OF THE INSTRUMENT

Instrument performance should not be affected by external factors such as electrical variations and interference, light, alterations in ambient temperature and humidity, vibration and dust.

The materials used in, and the construction of the instrument should not interact with chemicals and specimens in such a way as to affect the results. The instrument should be so designed that physical change, e.g. vibration and temperature, in one part of the instrument should not affect the correct function of any of its parts.

11. IDENTIFICATION OF INSTRUMENT DEFECTS

Identification of the source of an instrument defect should be automated. The information provided by such defect detection systems should identify the parts requiring service or replacement. Manufacturers should strive to ensure that most defects can be repaired by the user. The manufacturer must make clear in the user's instruction manual which defects of the instrument can be corrected by the operator and must support such information with full documentation.

12. INSTRUCTION MANUAL

A comprehensive instruction manual must be provided. A useful guide to the contents is contained in NCCLS (1) document "ASI-1, Preparation of manuals for installation, operation and repair of laboratory instruments".

(1) NCCLS : abbreviation for National Committee for Clinical Laboratory Standards, 771 E. Lancaster Ave., Villanova, Pa. 19085 (USA).

13. AVAILABILITY OF DOCUMENTATION OF COMPUTER PROGRAMS

Rarely is the data handling system within analytical instruments satisfactory for all situations and software alterations are frequently necessary. The manufacturer should provide documentation of calculation steps and enough details of the computer programs for the user to make changes.

GENERAL COMMENTS ON INSTRUMENT DESIGN

Instrument designers should be aware of the shortage of bench and floor space in the majority of clinical laboratories. Thus, the space occupied must be as small as possible. The need for special services such as ventilation, drainage, gases, etc. should be kept to a minimum as their provision may be difficult in a hospital environment. As computers and instruments are commonly provided from different sources, manufacturers should follow international agreements on the standardization of interface design.

The placing of controls and displays has considerable importance in complex instruments and satisfactory ergonomic design is an essential attribute of any instrument. Equally important in such design is the ability of the operators to maintain the instrument in a clean and efficient condition.

GLOSSARY

Some terms used in this document are defined here because their definitions in conventional dictionaries are ambiguous. Some definitions were already accepted by IUPAC Commissions, others were elaborated by the Commission on Automation.

Accuracy : Agreement between the best estimate of a quantity and its true value.

Automate (adj. automated) : To replace human manipulative effort and facilities in the performance of a given process by mechanical and instrumental devices which are regulated by feed-back of information, so that the apparatus is self-monitoring or self-adjusting.

Drift : A non-random change in signal with time.

Instrument (noun) : A device used for observing, measuring or communicating the state of quality, which replaces, refines, extends or supplements human faculties.

Note 1 : An instrument may include one or more mechanisms involved in the performance of useful work.

Note 2 : The use of the word instrument as a verb is not recommended.

Mechanism : A combination of parts of which at least one is movable and capable of producing an effect.

Monitor (verb) : To continually observe a system.

Noise : The random fluctuations occurring in a signal that are inherent to the combination of instrument and method.

Patient identification : Patient name and unique personal identification number.

Patient specifications : All information, including patient identification, that relates to the patient and is pertinent to the correct interpretation of a result.

Precision : Agreement between replicate measurements.

Program (noun) : Means for instructing a device to perform action.

Program (verb) : To provide a set of instructions requiring a device to perform action.

Report : A combination of patient information, specimen information and a result. The report may contain interpretative data such as comparison of the observed quantity with reference values.

Result : The final value reported for a measured quantity after performing a measuring procedure including all sub-procedures and evaluations.

Sample : That appropriately representative part of a specimen which is used in the analytical procedure. It is usually an accurately measured amount.

Specimen : The material available for analysis.

Note : A specimen may be further defined e.g. as "blood specimen", "serum specimen", to specify the kind of material.

Specimen identification : Patient identification and specimen specifications.

Specimen specifications : Nature of specimen, determinations requested, and all information specifically related to the specimen that is pertinent to the correct interpretation of a result.

PROVISIONAL

**INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY
COMMISSION ON QUANTITIES AND UNITS IN CLINICAL CHEMISTRY**

and

**INTERNATIONAL FEDERATION OF CLINICAL CHEMISTRY
EXPERT PANEL ON QUANTITIES AND UNITS**

QUANTITIES AND UNITS IN CLINICAL CHEMISTRY. OPTICAL SPECTROSCOPY: PART I – THEORETICAL OUTLINE AND GENERAL QUANTITIES

(Provisional Recommendations 1978)

Prepared for Publication by

J. C. RIGG and R. ZENDER

Comments on these proposals should be sent within 8 months of Publication to the Chairman of the Commission:

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Comments from the viewpoint of languages other than English are encouraged. These may have special significance regarding the eventual publication in various countries of translations of the nomenclature finally approved by IUPAC.

Titular Members: R. HERRMANN, C. ONKELINX, O. SIGGAARD-ANDERSEN, B. F. VISSER, R. ZENDER (Chairman).
IUPAC Associate Members: B. H. AMBRECHT, R. DYBKAER, K. JORGENSEN, P. MÉTAIS, J. C. RIGG.

QUANTITIES AND UNITS IN CLINICAL CHEMISTRY, OPTICAL SPECTROSCOPY, PART 1, THEORETICAL OUTLINE AND GENERAL QUANTITIES PROVISIONAL RECOMMENDATIONS, 1978.

IUPAC Commission on Quantities and Units in Clinical Chemistry and
IFCC Expert Panel on Quantities and Units.

Chairman : Doctor R. Zender, Laboratoire, Hôpital de La Chaux-de-Fonds,
CH-2301 La Chaux-de-Fonds, Switzerland.

PREFACE

The Commission on Quantities and Units in Clinical Chemistry (CQUCC) is part of the Section on Clinical Chemistry (SCC) of the International Union of Pure and Applied Chemistry (IUPAC). The titular members also serve as the Expert Panel on Quantities and Units (EPQU) of the Committee on Standards (CS) of the International Federation of Clinical Chemistry (IFCC).

The basic philosophy and general recommendations on quantities¹ and units in Clinical Chemistry were laid down in Recommendations 1973 and 1977 (IUPAC-CQUCC & IFCC-EPQU 1974, 1978). Certain terms defined there are used here without further explanation.

The present work is part of a series on optical spectrometry in clinical chemistry. Other aspects to be treated will be of more direct application in the clinical laboratory : molecular spectrometry in cuvettes and plates; molecular and atomic emission and absorption spectrometry in physico-chemical plasmas; properties of the equipment. Thus effects of cuvette walls are not treated in Part 1 and possible interferences, in the cuvettes, due mainly to scatter, fluorescence and polarisation are not discussed here. Problems related to multicomponent analysis and 'background' are also held over for Parts 2 and 3.

Part 1 has been based especially on recommendations already published by other IUPAC Commissions (IUPAC-CSTU and IUPAC-CSOPA) as well as on ISO and IEC publications. Codes used in citing authorities are explained in the list of references (§4). Some differences in names and definitions of the quantities have proved necessary, for instance to place some terms in a broader context than spectrometry.

Drafts on Part 1 were discussed at Madrid (September 1975) and Warsaw (August 1977) with representatives of IUPAC Commissions I.1 Physicochemical Symbols, Terminology and Units (CSTU), I.5 Molecular Structure and Spectroscopy (CMSS) and V.4 Spectrochemical and Other Optical Procedures for Analysis (CSOPA). The present text has been agreed at a joint meeting in Lyon (FR), 1977-10-24 and 25, by N. Sheppard (UK) and H.A. Willis (UK) for CMSS, by J. Robin (FR) for CSOPA and by J.C. Rigg (NL) and R. Zender (CH) for CQUCC. It also takes into account various comments, in particular those from L.R.P. Butler (ZA) of CSOPA.

1. In this recommendation 'quantity' is used in its broad meaning, including the concepts called 'quantity' and 'kind of quantity' in the 1977 recommendations.

CONTENTS

1. Introduction
2. General quantities in spectrometry
 - 2.1 Wavelength
 - 2.2 Wavenumber
 - 2.3 Frequency
 - 2.4 Refractive index
 - 2.5 Radiant energy
 - 2.6 Radiant power
 - 2.7 Radiant power density function in terms of wavelength
 - 2.8 Transmittance
 - 2.9 Absorptance
 - 2.10 Reflectance
 - 2.11 Attenuance
 - 2.12 Absorbance (decadic)
 - 2.13 Lineic (decadic) absorbance
 - 2.14 Molar lineic (decadic) absorbance
3. List of main (decadic) quantities
4. Bibliography

1. INTRODUCTION

1.1 Optical spectroscopy is the study of systems² by the electromagnetic radiation they produce or interact with and spectrometry is the measurement of such radiation as a means of obtaining information about the systems. Measurement of these physical phenomena provides information about the system and its components³. In some types of optical spectroscopy, radiation from an external source is modified whereas in others the radiation originates within the system.

1.2 In the former type, the sample to be analysed is irradiated. The properties of the radiation entering the system, called incident radiation, must therefore be specified. Incident rays may be transmitted through or may interact with the system. If they interact, one may observe absorption, reflexion, refraction, polarization, scatter (diffusion) or luminescence (phosphorescence or fluorescence).

1.3 In other branches of spectroscopy, the sample is heated to cause volatilization of components, dissociation of molecules, excitation of atoms and radicals, and ionization. Under these conditions, one may observe molecular or atomic emission. If there is also an external source of radiation, one may observe molecular or atomic absorption, and fluorescence too. These phenomena are specific to particular radicals or atoms.

1.4 The recommendations define quantities and units to describe these physical and chemical phenomena. Each section begins with a scheme like Table 1. The text below each scheme comprises a subsection defining and discussing the quantity, one on units and ways of expressing values, and usually an example. The subsection "Quantity" begins with a definition expressed in words and symbols. It is followed by numbered remarks. The subsection "Units and values" begins with a table of commonly used unit-symbols in order of decreasing magnitude with columns stating the multiple of the coherent⁴ SI unit, and recommended, accepted and other unit-symbols or means of expression.

| | | |
|--------------------------------------|----------------|-------|
| 4.1 ^a length ^b | l^c | L^d |
| De Länge; Fr longueur ^e ; | | |
| metre ^f | m ^g | |
| SI base unit ^h | | |

Table 1. Key to the layout of section headings. a. Section number. b. Name of quantity. c. Symbol for quantity. d. Dimension. e. Equivalents in German (De) and French (Fr). f. Name of coherent unit in the Système International d'Unités. g. Symbol of SI unit. h. Classification of unit.

Occasionally units mentioned under "Units and values" are outside the range relevant to spectrometry but are applicable to other phenomena in medical science.

The table of units may be followed by a definition of the coherent SI unit and by further remarks. Examples are presented in a format explained in IUPAC-CQUCC & IFCC-EPQU (1978, §7).

System -- Component, quantity = number x unit

1.5 In examples, a comma has been adopted as decimal marker as preferred internationally (ISO--31.0, §C.3.2; IUPAC-CQUCC & IFCC-EPQU 1978a, §5.2.6; IUPAC-CSTU 1975, §4.1; IUPAP 1977, §3.2). The full stop or period is tolerated and widely used in English text and for computer work. The half-raised point should not be used as a decimal marker, meaning (inter alia) 'multiplied by'.

2. 'System' is, for instance a piece of material, a patient, an organ or a tissue, which may be arbitrarily chosen and defined. For spectrometry, representative parts of the natural system may be taken and treated before measurement.

3. 'Component' may be a chemical compound (e.g. ethanol), an ion (e.g. Na⁺), a chemical group within one or more compounds (e.g. amino), or any definable group of entities with a common property (e.g. alkaline phosphatase).

4. The term 'coherent' in modern literature may be redundant as only coherent units are called SI now.

1.6 In these recommendations various quantities in §2 have been defined in terms of radiant power (§2.6, as also in ISO--31-6, IUPAC-CSOPA 1972 and IUPAC-CSTU 1975, §2.8) but may be defined in terms of other radiant or luminous quantities. For most purposes, the radiant quantity chosen to express the amount of radiation is of little consequence and may be called 'intensity'.

1.7 In expressing any data about radiation, it is necessary to state the region or band of the spectrum it refers to in terms of wavelength (§2.1), wavenumber (§2.2), frequency (§2.3) or quantum energy (Eqn 8). The regions of the spectrum may be classed as in Table 2.

| Name | Limiting values of range | | | |
|------------|--------------------------|-----------------------------------|----------|----------------------------------|
| | λ | $\sigma; \tilde{\nu}$ | ν | $E(\phi)$ |
| X-rays | 10 pm | $100 \times 10^9 \text{ m}^{-1}$ | 30,0 EHz | $19,9 \times 10^{-15} \text{ J}$ |
| | 10 nm | $100 \times 10^6 \text{ m}^{-1}$ | 30,0 PHz | $19,9 \times 10^{-18} \text{ J}$ |
| vacuum uv. | 200 nm | $5,00 \times 10^6 \text{ m}^{-1}$ | 1,50 PHz | $993 \times 10^{-21} \text{ J}$ |
| near uv. | 380 nm | $2,63 \times 10^6 \text{ m}^{-1}$ | 789 THz | $523 \times 10^{-21} \text{ J}$ |
| visible | 780 nm | $1,28 \times 10^6 \text{ m}^{-1}$ | 384 THz | $255 \times 10^{-21} \text{ J}$ |
| near ir. | 2,5 μm | $400 \times 10^3 \text{ m}^{-1}$ | 120 THz | $79,5 \times 10^{-21} \text{ J}$ |
| mid ir. | 30 μm | $33,3 \times 10^3 \text{ m}^{-1}$ | 9,99 THz | $6,62 \times 10^{-21} \text{ J}$ |
| far ir. | 1 mm | $1,00 \times 10^3 \text{ m}^{-1}$ | 300 GHz | $199 \times 10^{-24} \text{ J}$ |
| microwaves | 100 mm | $10,0 \text{ m}^{-1}$ | 3,00 GHz | $1,99 \times 10^{-24} \text{ J}$ |

Table 2. Limiting values of wavelength λ , wavenumber σ or $\tilde{\nu}$, frequency ν and energy of a quantum $E(\phi)$ for different regions of the spectrum. The values of wavelength and wavenumber apply only in media with a refractive index close to 1, namely in vacuo and in air (§2.3, Remark 1). Calculated values are rounded to 3 digits; values of h and c_0 are given in §2.3, Remarks 1 and 2.

'Infrared' is a widely used alternative for what is here called 'mid infrared'. The upper wavelength limit of far infrared is sometimes placed at 0,3 mm.

1.8 One way of expressing place in spectrum is by 'spectral' derivatives, of which only that of power as a function of wavelength is discussed in detail (§2.7).

1.9 Analogous to the radiant group of quantities are a luminous group (IUPAC-CSTU 1975, p. 10, Footn. 2), for instance luminous intensity expressed in candelas and analogous to radiant intensity (steradic radiant power)⁵, and a group based on quanta, for instance number flux⁵ of photons expressed in s^{-1} and analogous to radiant power (§2.6). The luminous group is applicable only in the visible spectrum, for instance when 'optical density' (§2.12, Remark 2) is assessed by eye.

5. These systematic names are to be submitted to IUPAC in a separate document entitled "Systematic names for intensive derivatives of extensive quantities". Their use here is tentative (§1.11).

1.10 Among deprecated synonyms of names for quantities in optical spectroscopy, 'density' (De Dichte; Fr densité) is used in at least three meanings :

- divided by area, for instance 'radiant flux density'
- divided by volume, for instance 'radiant energy density'
- degree to which a sample cuts down the intensity of a beam passing through it, for instance 'optical density' or 'transmission density'.

1.11 To circumvent difficulties of naming intensive derivatives of quantities describing radiation and changes in systems (draft in preparation), various terms have been coined or adapted from French to designate intensive derivatives of any extensive quantity⁵. They are necessary for certain quantities that had no agreed name and for those whose existing name is ambiguous (as are names including 'density'). Where existing names are unambiguous, they are usually shorter and may be preferred even though they are less descriptive.

The following words, nouns or adjectives are used in this document with the meanings below :

entitic; De entitätig; Fr entitique (§2.1) : a quantity for a component or system divided by the number of a specified kind of entity of the component or in the system.

lineic; De längenbezogen (DIN-1301); Fr linéique (NF-X02-020) (§2.2; 2.13) : a quantity for a component or system divided by a length.

massic; De massenbezogen; Fr massique (NF-X02-020) (§2.5, 2.14) : a quantity for a system divided by the mass of the system.

ratio; De Verhältnis; Fr rapport : a quantity for one component divided by a quantity of the same kind for another component within the system.

fraction; De Anteil; Fr fraction (§2.8-10) : a quantity for a component divided by a quantity of the same kind for the system or for all components of the system.

relative; De relativ; Fr relatif : a quantity for one system divided by a quantity of the same kind for another system.

coefficient; De Koeffizient; Fr coefficient : a quantity divided by a quantity of another kind within one system.

flux; De Fluss; Fr flux (§2.3; 2.6) is the partial differential quantity for a system or component to time.

debit (or mean rate); De Mittelgeschwindigkeit; Fr débit (ou vitesse moyenne) : the increment of a quantity in a system divided by the time interval of that increment.

1.12 Quantities sometimes called 'internal', that could be described as 'intersurfacic', are used when certain boundary effects need to be excluded (Pt 2, in preparation). They may be given the same symbols. Since they are, however, differently defined, they should be distinguished, for instance by the subscript i.

1.13 Measurements are commonly expressed logarithmically (§2.11-14 and 2.9, Remark 4) and may be either 'decadic' (Briggsian) or 'natural' (Napierian). Since the decadic group are usual, they are treated here in full and the unqualified term may usually be taken to refer to the decadic type. In research papers, the base should be specified initially.

5. These systematic names are to be submitted to IUPAC in a separate document entitled "Systematic names for intensive derivatives of extensive quantities". Their use here is tentative.

2. GENERAL QUANTITIES IN SPECTROMETRY

2.1 WAVELENGTH

λ

L

De Wellenlänge; Fr longueur d'onde

metre

m

SI base unit

Quantity

Wavelength is a distance, l , in the direction of propagation of a regular wave divided by the number of cycles of the wave, N , in that distance at one moment :

$$\lambda = l/N \quad (1)$$

Wavelengths in systems being investigated may be far different from those in vacuo or in air. By convention, spectrometric properties are expressed in terms of wavelength in vacuo, and not of wavelength in the system under investigation.

Remark 1. The essential difference from some other definitions of wavelength (e.g. ISO--31.6, §3.1) is length per wave, in contrast to length of a wave, length per wave being the property usually measured. Systematically wavelength and, for instance, length per unit in a crystal lattice can be called entitic length (§1.11).

Remark 2. For other ways of specifying position or distribution in the spectrum see §1.7. Terms and symbols for 'spectral' properties are discussed in §2.7, Remark 3.

Remark 3. Wavelength depends on the refractive index, n , of the medium in which the wave travels. Wavelength in a medium, λ_1 , is related to wavelength in vacuo, λ_0 , by the equation

$$\lambda_1/\lambda_0 = n_0/n_1 \quad (2)$$

Since the refractive index of a vacuum, n_0 , is 1 by definition,

$$\lambda_1 = \lambda_0/n_1 \quad (3)$$

Spectrometry is usually performed in air, for which under laboratory conditions the refractive index is very close to 1, so that

$$\lambda(\text{air}) \approx \lambda_0 \quad (4)$$

For more accurate values of the refractive index of air see : Handbook of Chemistry and Physics 48th ed. 1967-1968, p. E 160.

Units and values of wavelength

Multiple
of coherent
SI units

Ways of expression

recommended

accepted

other

| | | | |
|------------|---------------|----------------------------|---------------------------|
| 10^{-6} | μm | $\times 10^{-6} \text{ m}$ | μ |
| 10^{-9} | nm | $\times 10^{-9} \text{ m}$ | m μ ; m μm |
| 10^{-10} | | | \AA |

Remark 4. Much of the existing data are reported in angströms and the conversion is :
1 nm = 10 \AA

Remark 5. The micrometre is recommended for the infrared region and the nanometre for the visible and ultraviolet region of the spectrum (§1.7).

Examples

- 1) Radiation absorbed at maximum absorbance by sickle cell haemoglobin -- wavelength = 418 nm
- 2) Emission Line 1 of excited sodium atoms -- wavelength = 589,0 nm
Emission Line 2 of excited sodium atoms -- wavelength = 589,6 nm

2.2 WAVENUMBER

$\sigma; \tilde{\nu}$
 L^{-1}

De Wellenzahl; Fr nombre d'ondes
one per metre
derived coherent SI unit

m^{-1}

Quantity

Wavenumber is the number of cycles of a wave, N , in a given distance, l , in the direction of propagation of the wave divided by that distance :

$$\sigma = N/l \tag{5}$$

From Equations 1 and 5, it follows that

$$\sigma = 1/\lambda \tag{6}$$

(IUPAC-CSTU 1975, §2.1.07).By convention, the wavenumber used in spectrometry is that in vacuo (or in air), and not in the system being radiated.

Remark 1. Wavenumber, in the unit of cm^{-1} , is used in molecular spectroscopy, mainly in the infrared region. In routine analysis, radiation at a fixed place in the visible and ultraviolet spectrum is at present characterized by wavelength rather than wavenumber (§1.7).

Remark 2. The alternative symbol $\tilde{\nu}$ (IUPAC-CSTU 1975; deprecated by GE-RS 1975, p. 12) should not be written $\bar{\nu}$, which would designate mean frequency.

Remark 3. A systematic and more broadly applicable term is lineic (§1.11) number of waves (Fr nombre d'ondes linéiques).

Remark 4. The corresponding vector quantity is called wave vector (ISO-DIS--31.2, §6.1) and is symbolized k (IUPAC-CSTU; ISO) or σ (GB-RS 1975, which reserves k for 'circular wavevector').

Units and values of wavenumber

| Multiple of coherent SI unit | Ways of expression | | |
|------------------------------------|------------------------------|--------------------|-------|
| | recommended | accepted | other |
| 10^6 | $\times 10^6 \text{ m}^{-1}$ | μm^{-1} | |
| 10^3 | $\times 10^3 \text{ m}^{-1}$ | mm^{-1} | |
| 10^2 | | cm^{-1} | |

Remark 5. In molecular spectroscopy, values are customarily expressed in cm^{-1} . They have the magnitude of 10^5 m^{-1} (1000 cm^{-1}) in the infrared region and of 10^7 m^{-1} ($10\,000 \text{ cm}^{-1}$; $10 \mu\text{m}^{-1}$) in the visible and ultraviolet region.

2.3 FREQUENCY

De Frequenz; Fr fréquence
hertz; one per second
derived coherent SI unit

ν T^{-1}

Hz; s^{-1}

Quantity

Frequency is the number, N , of periodic phenomena such as a regular wave, in a given time, t , divided by that time :

$$\nu = N/t \tag{7}$$

Remark 1. Frequency is proportional to energy of a quantum, $E(\Phi)$, which is the product of Planck constant, h (IUPAC-CSTU 1975, §2.8.01), and frequency, so that

$$\nu = E(\Phi)/h \tag{8}$$

where h is about $0,662\ 6 \times 10^{-33}$ J.s. Frequency is also related to the velocity of light in vacuo, c (IUPAC-CSTU 1975, §2.8.20), and to wavelength, λ :

$$\nu = c/\lambda \tag{9}$$

if c and λ refer to the same medium, for instance air.

Remark 2. For calculation of frequency from wavelength, the velocity of radiation in vacuo, c_0 , can be taken as $0,299\ 8 \times 10^9$ m.s⁻¹.

Remark 3. For oscillatory phenomena, in electronics, frequency is designated by the symbol f (IUPAC-CSTU 1975, §2.1.13; ISO 31.2, §3.1).

Remark 4. Frequency can also be called number flux (§1.11) of waves. The same concept covers rotational frequency or rate of revolution, symbolized n (ISO-DIS--31.2, §3.2; GB-RS 1975, p. 12).

Units and values of frequency

| Multiple of coherent SI unit | Ways of expression | | |
|------------------------------------|--------------------|------------------|--------------------------------|
| | recommended | accepted | other |
| 10^{15} | PHz | fs ⁻¹ | |
| 10^{12} | THz | ps ⁻¹ | |
| 10^9 | GHz | ns ⁻¹ | |
| 10^6 | MHz | μs ⁻¹ | |
| 10^3 | kHz | ms ⁻¹ | |
| 1 | Hz | s ⁻¹ | sec ⁻¹ ; c/s; c/sec |

Remark 5. The unit hertz (Hz) is permitted by the Conférence Générale des Poids et Mesures (CGPM) only for the periodic phenomena. The unit s⁻¹ and its multiples may be used for all types of phenomena but are widely misunderstood, for instance

$$ps^{-1} = T(s^{-1}) = THz \neq p(s^{-1}).$$

Remark 6. In the infrared and visible region, values can be expressed as a multiple of 10^{12} s⁻¹ or in THz, being less than 10^{15} s⁻¹. In the ultraviolet region, they can be expressed in THz or PHz, being around 10^{15} Hz. The unit MHz is in common use in microwave spectroscopy.

2.4 REFRACTIVE INDEX

n

1

De Brechungsindex; Brechzahl; Fr indice de réfraction
unity
coherent SI unit

1

Quantity

Refractive index is the ratio of the phase velocity of electromagnetic radiation of specified wavelength in vacuo (*c*₀) to its phase velocity in a specified system (*c*₁) :

$$n_1 = c_0/c_1 \tag{10}$$

(IUPAC-CSTU 1975, §2.8.21.1)

Remark 1. Refractive index is usually calculated as the ratio of the sine of the angle of incidence (*α*₀) of a beam in air to the sine of the angle of refraction (*α*₁) :

$$n = \sin \alpha_0 / \sin \alpha_1 \tag{11}$$

This is valid for those regions of the spectrum where the difference in refractive index of air and vacuum is negligible (§2.1, Remark 3).

Example : Refractive index of blood serum (*t* = 20 °C; *λ* = 500 nm) with usual concentration of protein is about 1,35.

2.5 RADIANT ENERGY

Q

L²MT⁻²

De Strahlenergie; Strahlungsenergie; Fr énergie rayonnante
joule
derived coherent SI unit

J

Quantity

Radiant energy, *Q* (IUPAC-CSTU 1975, §2.8.03; GB-RS 1975, p. 15) is energy propagated as electromagnetic radiation. It varies in space and with direction. Values depend on the type of radiation, for instance spectral distribution and on properties of the equipment.

Remark 1. Absorbed (energy) dose (De absorbierte Strahlungsmenge; Dosis; Fr dose de rayonnement) usually refers to radiant energy absorbed by a system, for instance an organism, and not to that incident or passing through. The components of the energy balance need to be defined in each case. The definition of 'absorbed dose' in ISO-31.10, §49.1 makes it 'massic (§1.11) energy dose'.

Remark 2. Energy absorbed by a system is considered as a positive change (Eqn 15; see IUPAC-CSTU 1975, p. 7, Footn. 2).

Units and values of radiant energy

Multiple
of coherent
SI unit

Ways of expression

| | recommended | accepted | other |
|------------------|-------------|----------|-------|
| 1 | J | | |
| 10 ⁻³ | mJ | | |
| 10 ⁻⁶ | μJ | | |
| 10 ⁻⁷ | | | erg |

$$J = m^2 \cdot kg \cdot s^{-2} = W \cdot s = N \cdot m \tag{12}$$

2.6 RADIANT POWER

$P; \Phi$

$L^2 MT^{-3}$

De Strahlungsleistung; Dosisleistung; Fr puissance rayonnante
watt
derived coherent SI unit

Quantity

Radiant power is power transmitted as electromagnetic radiation. It varies in space and with direction. Values depend on the type of radiation, for instance spectral distribution and on properties of the equipment. Power sometimes means energy flux (§1.11) :

$$P = dQ/dt \quad (13)$$

It is usually defined (ISO-31.3, §23.1; IUPAC-CSTU 1975, §2.2.18) as energy transferred to a defined system, ΔQ , in a given time, Δt , divided by that time; it can thus be called energy debit (Fr débit énergétique) (§1.11) :

$$\bar{P} = \Delta Q/\Delta t \quad (14)$$

Remark 1. Radiant power is also called radiant (energy) flux (De Strahlungsfluss; Fr flux énergétique; flux de rayonnement) (ISO--31.6, §9.1; IUPAC-CSTU 1975, §2.8.04). P is the general symbol for power. Φ (preferred by GB-RS 1975, p. 15) is the general symbol for flux and may here be modified by the subscript e (for energy).

Remark 2. For incident, reflected, refracted, fluorescent, absorbed and transmitted components of radiation, symbols such as that for radiant power may be modified by the subscripts 0, refl, refr, fl, abs and tr. In defining 'internal' quantities (§1.12), radiant power transmitted through a cuvette of solvent or medium may be designated by the subscript A (and not by 0).

Remark 3. In the absence of scatter and fluorescence,

$$\Phi_0 = \Phi_{\text{refl}} + \Phi_{\text{abs}} + \Phi_{\text{tr}} \quad (15)$$

Whether Φ_0 , Φ_{refl} , Φ_{abs} , Φ_{tr} are negative or positive depends on the system under consideration. In this text, these quantities are expressed as positive. The modifier refl is usually reserved for reflexion at the surfaces of the sample and does not include reflexion from particles suspended in the sample (normally measured as part of 'scatter'). 'Scattered radiant power' includes part of the power from reflexion and refraction within the sample, for instance from suspended particles and is not discussed further here. The term 'attenuation' can be used for the decrease in power of a beam, even if the cause is unknown, whereas the term 'absorption' implies that the cause of a measured decrease in radiant power is known (§2.11, Remark 1; §2.12, Remark 1).

Remark 4. In the presence of scatter or fluorescence, the total power Φ_{tr} , emerging in the direction of the beam, includes contributions from these processes.

Units and values of radiant power

Multiple
of coherent
SI unit

Ways of expression

recommended

accepted

other

1

W

$J \cdot s^{-1}$

1/86,4

$kJ \cdot d^{-1}$

10^{-3}

mW

$mJ \cdot s^{-1}$

10^{-6}

μW

$\mu J \cdot s^{-1}$

10^{-7}

$erg \cdot s^{-1}$

$$W = m^2 \cdot kg \cdot s^{-3} \quad (16)$$

Remark 5. The unit kilojoule per day (kJ·d⁻¹) is used, for instance, in describing solar radiant debit incident on an organism.

2.7 RADIANT POWER DENSITY FUNCTION

IN TERMS OF WAVELENGTH

watt per metre
derived coherent SI unit

$$\begin{array}{l} \phi_{\lambda} \\ W \cdot m^{-1} \end{array} \qquad LMT^{-3}$$

Quantity

When power Δφ is measured over a small interval of wavelength Δλ, the quotient

$$\phi_{\lambda} = \Delta\phi/\Delta\lambda \quad (17)$$

is an estimate of radiant power density function, φ_λ, at the mean wavelength of the interval Δλ.

Radiant power, φ_{1→2}, in a waveband λ₁ to λ₂, is the integral of the radiant power density function in terms of wavelength φ_λ over the wavelength interval dλ :

$$\phi_{1\rightarrow 2} = \int_1^2 \phi_{\lambda} \cdot d\lambda \quad (18)$$

The function φ_{1→2} may be called the radiant power distribution function in terms of wavelength.

Remark 1. These functions have no agreed names. The terms created are based on ISC-3534 (1977, §1.3 and 1.4), according to which the term wavelength distribution function would designate the integral of Eqn 18.

Remark 2. In practice, measurements over a continuous spectrum from λ₁ to λ₂ are in terms of the mean density function in terms of wavelength :

$$\bar{\phi}_{\lambda} = \int_1^2 \phi_{\lambda} \cdot d\lambda / \Delta_{1\rightarrow 2}^{\lambda} = \Delta\phi / \Delta_{1\rightarrow 2}^{\lambda} \quad (19)$$

where Δ_{1→2}^λ is a wavelength interval.

Remark 3. The density function is also called spectral radiant power or spectral concentration of radiant power (De spektrale Strahlungsleistung; Fr puissance rayonnante spectrale) but those terms also designate other density functions, for instance in terms of wavenumber or frequency which are symbolized φ_σ and φ_ν, respectively. In other terms, 'spectral' designates a property at a place in the spectrum and not a density function, for instance spectral transmittance. In that meaning, the modifier should not be a subscript but a parenthesis, such quantities are here designated 'monochromatic' instead (e.g. §2.8, Remark 2).

Units and values of radiant power density function in terms of wavelength

Multiple
of coherent
SI unit

Ways of expression

| | recommended | accepted | other |
|------------------|--------------------|--------------------|--------------------|
| 10 ¹⁰ | | | W·Å ⁻¹ |
| 10 ⁹ | GW·m ⁻¹ | W·nm ⁻¹ | |
| 10 ⁶ | MW·m ⁻¹ | W·μm ⁻¹ | |
| 10 ³ | kW·m ⁻¹ | W·mm ⁻¹ | |
| 10 ² | | | W·cm ⁻¹ |
| 1 | W·m ⁻¹ | | |

Remark 4. In the infrared region, with power of about 1 W, values could be expressed in megawatts per metre or in watts per micrometre. In the visible and ultraviolet region, under similar conditions, values could be expressed in gigawatts per metre or in watts per nanometre.

Remark 5. $1 \text{ W}\cdot\text{cm}^{-1} = 0,1 \text{ kW}\cdot\text{m}^{-1}$; $1 \text{ kW}\cdot\text{m}^{-1} = 10 \text{ W}\cdot\text{cm}^{-1}$
 $1 \text{ W}\cdot\text{\AA}^{-1} = 10 \text{ GW}\cdot\text{m}^{-1}$; $1 \text{ GW}\cdot\text{m}^{-1} = 0,1 \text{ W}\cdot\text{\AA}^{-1}$

Remark 6. The ordinate of graphs of radiant properties like energy or power against wavelength, wavenumber or frequency are usually density functions and should, for instance, be labelled Φ_λ in $\text{GW}\cdot\text{m}^{-1}$ but are often erroneously labelled, for instance Φ in W.

Remark 7. For other radiant power density functions ('spectral radiant power'), the following units may be used :

density function in terms of wavenumber, Φ_σ : $\text{W}\cdot\text{m}$

density function in terms of frequency, Φ_ν : $\text{W}\cdot\text{s}$

2.8 TRANSMITTANCE

| | | |
|---|--------|---|
| De optische Durchlassigkeit; Durchlassigkeitsverhältnis; Fr facteur de transmission | τ | 1 |
| unity | 1 | |
| coherent SI unit | | |

Quantity

Transmittance is total radiant power, Φ_{tr} , transmitted in the direction of the beam, by a system divided by incident radiant power, Φ_0 :

$$\tau = \Phi_{\text{tr}}/\Phi_0 \tag{20}$$

(IUPAC-CSTU 1975, §2.8.11). Values depend on, for instance, spectral distribution and on properties of the equipment and system.

Remark 1. The term 'transmission factor' (IUPAP 1977, §7.6.29; IUPAC 1975, §2.8.11) is also used for this quantity and for internal transmittance, and has equivalents in other languages. The term 'transmission' was formerly used but designates the process rather than the measurable property. A more lucid systematic term is 'transmitted radiant fraction' (§1.11).

Remark 2. Spectral or monochromatic transmittance (§2.7, Remark 3) is the radiant power density function in terms of wavelength transmitted through a sample divided by that incident on the sample for any particular wavelength λ :

$$\tau(\lambda) = \Phi_{\lambda,\text{tr}}/\Phi_{\lambda,0} \tag{21}$$

Remark 3. Instruments are commonly calibrated on an arithmetic or a negative logarithmic scale, labelled transmittance and absorbance (or extinction) (§2.12), respectively. The terms transmitted radiant fraction and extinction coefficient (§2.12, Remark 1) (or attenuation) would avoid unwarranted assumptions about the cause of attenuation (§2.6, Remarks 3 and 4).

Remark 4. Values should be expressed preferably as decimals rather than as percentages.

2.9 ABSORPTANCE

| | | |
|--|----------|---|
| De Absorptionsverhältnis; Absorptionsfaktor; Fr facteur d'absorption | α | 1 |
| unity | 1 | |
| coherent SI unit | | |

Quantity

Absorptance is radiant power absorbed by a system, Φ_{abs} , divided by incident radiant power Φ_0 :

$$\alpha = \Phi_{\text{abs}} / \Phi_0 \quad (22)$$

(IUPAC-CSTU, 1975, §2.8.09). Values depend on spectral distribution and on properties of the equipment and the system, for instance pathlength and concentration of solutes.

Remark 1. If it be assumed that no radiation is reflected from the boundaries of the sample nor is scattered, Equation 15 can be simplified and transposed :

$$\Phi_{\text{abs}} = \Phi_0 - \Phi_{\text{tr}} \quad (23)$$

By combining Equations 22 and 23,

$$\alpha = (\Phi_0 - \Phi_{\text{tr}}) / \Phi_0 \quad (24)$$

so that then

$$\alpha = 1 - \tau \quad (25)$$

Remark 2. The term 'absorption factor' is also used for this quantity and for internal absorptance. A more specific systematic term is 'absorbed radiant fraction' (§1.11).

Remark 3. The fraction of incident radiant power lost from a beam during passage through a sample cannot be called absorptance if the decrease be partly due to scatter. The quantity may then be called attenuated radiant fraction, defined by Equation 24 or 25. The terms attenuation factor, extinction factor and attenuation coefficient are sometimes used in the meaning of Eqn 24.

Remark 4. If the absorbed radiant fraction is small ($< 0,02$), (internal) absorptance is a more practical quantity than absorbance (see §2.12), for instance in trace analysis, as one can assume that Napierian absorbance equals absorptance values with sufficient accuracy. Absorptance is then also proportional to decadic absorbance.

Remark 5. Spectral or monochromatic absorptance (§2.7, Remark 3) is the ratio of the radiant power density function in terms of wavelength absorbed, $\Phi_{\lambda,\text{abs}}$, to that incident on a system, $\Phi_{\lambda,0}$, for any particular wavelength λ :

$$\alpha(\lambda) = \Phi_{\lambda,\text{abs}} / \Phi_{\lambda,0} \quad (26)$$

Remark 6. Values should be expressed as decimals rather than as percentages.

2.10 REFLECTANCE

ρ

1

De Reflexionsgrad; Reflexionsfaktor; Fr facteur de réflexion;
unity

1

coherent SI unit

Quantity

Reflectance is radiant power reflected from the surfaces of a system in a specified direction, Φ_{refl} , divided by incident radiant power, Φ_0 :

$$\rho = \Phi_{\text{refl}} / \Phi_0 \quad (27)$$

(IUPAC-CSTU 1975, §2.8.10). Values depend on the radiation, for instance spectral distribution and on properties of the equipment and of the boundaries of the sample, for instance refractive index.

Remark 1. The term 'reflexion factor' or 'reflection factor' (IUPAP 1977, §7.6; IUPAC-CSTU 1975, §2.8.10) is also used. 'Reflected radiant fraction' (§1.11) is a more lucid and explicit term.

Remark 2. If scatter (reflexion and refraction within the system) and fluorescence are absent, the sum of transmittance, absorptance and reflectance is 1 :

$$\tau + \alpha + \rho = 1 \tag{28}$$

Remark 3. The spectral or monochromatic (§2.7, Remark 3) kind of quantity, $\rho(\lambda)$ is defined as the quotient of radiant power density function in terms of wavelength as in §2.8, Remark 2 and §2.9, Remark 5.

Remark 4. Values should be expressed as decimals rather than as percentages.

2.11 ATTENUANCE⁶

μ

L^{-1}

m^{-1}

one per metre

derived coherent SI unit

Quantity

Attenuance is the negative decadic logarithm of transmittance of a beam through a pathlength divided by that pathlength :

$$\mu = -\Delta \lg \tau / \Delta l \tag{29}$$

Remark 1. For homogeneous isotropic systems without boundary effects, attenuance equals the differential quantity. The quantity is also called extinction coefficient. 'Attenuance' applies, whether the decrease in power in the beam be due to absorption, scatter or fluorescence, since Φ_{tr} is the total power transmitted through the system and emergent in the direction of the beam (§2.6, Remark 4).

Remark 2. That quantity has been called linear extinction coefficient (GB-RS 1975, p.15) or (decadic) extinction coefficient (IUPAC-CSTU 1975, p.10, Footn. 4) (De Extinktionskoeffizient) and has also been symbolized ϵ . The symbol ϵ is here reserved for molar lineic absorbance (§2.14). The differential quantity has been called (linear) attenuation coefficient (Fr constante d'affaiblissement; coefficient d'atténuation (linéique)) (ISO--31.6, §31.1; IUPAP 1977, §7.6.30), but that term is used whether the decrease is arithmetic (§2.9, Eqn 24 and Remark 3) or exponential.

Remark 3. For units and values, see §2.13.

Remark 4. The analogous Napierian quantities (IUPAP 1977, §7.1 attenuation coefficient; Fr constante d'affaiblissement) may be called Napierian attenuance and differential Napierian attenuance.

2.12 (DECADIC) ABSORBANCE

A

1

1

De (dekadisches) Absorptionsmass; Fr absorbance (décimale)

unity

coherent SI unit

Quantity

Decadic absorbance is the negative decadic logarithm of one minus absorptance :

$$A = -\lg (1 - \alpha) \tag{30}$$

6. The term 'attenuance' is tentative

when $\alpha \approx 1 - \tau$ (§2.9, Remark 1), then

$$A \approx -\lg \tau = \lg (1/\tau) = \lg (\phi_0/\phi_{tr}) \quad (31)$$

The term 'absorbance' applies only to the decrease in radiant power due entirely to absorption. Values depend on the radiation, for instance spectral distribution and on properties of the equipment and system.

Remark 1. Where the loss of power was partly due to scatter, the quantity has been called extinction or (decadic) extinction coefficient (De (dekadische) Extinktion; Fr coefficient (décimal) d'extinction) and has been symbolized E .

Remark 2. The term 'transmission density', D , is also used (IUPAC-CSTU 1975, §2.8.13.1). 'Optical density', D , has several meanings. It is used mainly for non-monochromatic light (§1.9-10) or for suspensions (GB-RSM 1972, p.28). The French standard NF-T-01--030 (1972 - 01) defines 'densité optique' by Equation 31. The quantity has also been called 'absorption coefficient' (confusable with absorptance) and 'transmission coefficient'. Since the related internal quantity (Part 2) is the one used in analysis of solutions where values are measured with reference to those of pure solvent or a reference solution (IUPAC-CSTU 1975, p.11, Footn. 7), the term 'absorbance' should perhaps be reserved for that quantity as has been done by the French standard and by IUPAC-CSTU (§2.8.13.1) but the concept of §2.12 would then be left without a name.

Remark 3. Symbols with subscripts or superscripts like $A_{10 \text{ mm}}^{10 \text{ g/l}}$ should be avoided (IUPAC-CSTU 1975, §2.10).

Remark 4. Napierian absorbance is defined analogously :

$$B = -\ln (1 - \alpha) \quad (32)$$

Once the quantity has been defined in a text, 'decadic' or 'Napierian' may be omitted from the term.

Remark 5. Absorbance has values from 0 to ∞ , the useful limits depend, inter alia, on the equipment and its adjustment.

2.13 LINEIC⁷ (DECADIC) ABSORBANCE $\alpha \quad L^{-1}$

De (dekadische) Absorptionsmass; Fr absorbance (décimale) linéique
1 per metre m^{-1}
derived coherent SI unit

Quantity

Lineic (decadic) absorbance is decadic absorbance A divided by the pathlength l of the beam through the system :

$$\alpha = A/l \quad (33)$$

(IUPAC-CSTU 1975, §2.8.14.1). The term applies only if the decrease in radiant power is due to absorption. The term is also called (linear) absorption coefficient (IUPAC-CSTU, 1975, §2.8.14.1; GB-RS 1975, p.15).

Remark 1. If the cause of the loss of power is partly due to scatter or fluorescence, the quantity is attenuation (§2.11)

Remark 2. The symbols K (IUPAC-CSTU 1975, §2.8.14.1) and k sometimes designate lineic absorbance, but have other meanings in spectrometry. Notations like $A_{10 \text{ mm}}$ should not be used, pathlength being incorporated in any data expressed in terms of lineic absorbance.

7. The proposed term 'lineic' means divided by distance (§1.11).

Remark 3. Partial lineic absorbances due to a series of components B, C ... N can be symbolized a_B (or $a(B)$), a_C ... a_N and, according to theory, are additive as long as the components do not interact. The modifiers A and R should be reserved for solvent (or medium) and for a reference component, respectively.

Remark 4. Lineic Napierian absorbance is defined analogously but use of this quantity is discouraged :

$$\beta = B/l \tag{34}$$

The symbol α (IUPAC-CSTU 1975, §2.8.14.2) should not be used for lineic Napierian absorbance, being confusable with absorptance (§2.9). It is used by ISO-DIS--31.2 (§11.1), IUPAP (1977, §7.1) and GB-RS (1975, p.12) for Napierian attenuation (§2.11, Remark 4), there called 'attenuation coefficient'. Once the name of the quantities have been defined in a text, the term 'decadic' or 'Napierian' may be omitted.

Units and values of lineic absorbance

| Multiple of coherent SI unit | Ways of expression | | |
|------------------------------------|------------------------------|------------------|-------|
| | recommended | accepted | other |
| 10^3 | $\times 10^3 \text{ m}^{-1}$ | mm^{-1} | |
| 10^2 | | cm^{-1} | |
| 1 | m^{-1} | | |

Remark 5. Graphs through the spectrum of α or β on a logarithmic scale are identical in shape with those of A or B (§2.12).

2.14 **MOLAR LINEIC (DECADIC) ABSORBANCE** ϵ $\text{L}^2 \text{N}^{-1}$
 De molare lineare (dekadische) Absorbanz; Fr absorbance (décimale) linéique molaire
 square metre per mole $\text{m}^2 \cdot \text{mol}^{-1}$
 derived coherent SI unit

Quantity

Molar lineic (decadic) absorbance is the lineic (decadic) absorbance due to a component divided by substance concentration of that component :

$$\epsilon = a/c \tag{35}$$

(IUPAC-CSTU 1975, §2.8.17.1). The term applies only if the decrease in radiant power is entirely due to absorption; values depend on the type of radiation (§2.5) and properties of the system (§2.9).

Remark 1. Molar in the above term means the quantity (lineic absorbance) divided by substance concentration and not, as usually, divided by amount of substance.

Remark 2. The broader term molar attenuation, symbolized μ_c , should be used if the cause of the decrease in radiant power is partly due to scatter or fluorescence. The differential quantity has been called molar (decadic) extinction coefficient or molar attenuation coefficient.

Remark 3. The following symbols have been used for molar lineic absorbance but are not recommended : $E, K, k, a_m, a_M, D^1_{10 \text{ mm}} \text{ mol/l}$.

Remark 4. Molar lineic absorbance has also been called molar absorptancy index, molar absorptivity (IUPAC-CSTU 1975, p. 11, Footn. 4) and molar (decadic) absorption coefficient (IUPAC-CSTU 1975, §2.8.17.1).

Remark 5. Molar lineic Napierian absorbance and molar Napierian attenuance are defined analogously :

$$\kappa = \beta/c \tag{36}$$

(IUPAC-CSTU 1975, §2.8.17.2). Once the quantities have been defined in a text, 'decadic' or 'Napierian' may be omitted from the terms.

Remark 6. Analogous derivatives of mass concentration of an absorbing component exist and are called 'specific' (IUPAC-CSTU 1975, §2.8.16) or 'massic' meaning here the quantity divided by mass concentration and not, as usually, divided by mass (§1.11).

Units and values of molar lineic absorbance

| Multiple of coherent SI unit | Ways of expression | | |
|------------------------------------|--|-------------------------------------|--|
| | recommended | accepted | other |
| 10^3 | $\times 10^3 \text{ m}^2 \cdot \text{mol}^{-1}$ | $\text{m}^2 \cdot \text{mmol}^{-1}$ | $\text{m}^{-1} \cdot \text{mM}^{-1}$; $\text{kl} \cdot \text{mol}^{-1} \cdot \text{m}^{-1}$ |
| 10^2 | | | $\text{l} \cdot \text{mmol}^{-1} \cdot \text{cm}^{-1}$; $\text{M}^{-1} \cdot \text{cm}^{-1}$ |
| 1 | $\text{m}^2 \cdot \text{mol}^{-1}$ | | $\text{l} \cdot \text{mmol}^{-1} \cdot \text{m}^{-1}$; $\text{M}^{-1} \cdot \text{m}^{-1}$ |
| 10^{-1} | | | $\text{l} \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$ |
| 10^{-2} | | | $(\text{mol} \cdot \%)^{-1} \cdot \text{cm}^{-1}$; $(\text{mol}/100 \text{ ml})^{-1} \cdot \text{cm}^{-1}$ |
| 10^{-3} | $\times 10^{-3} \text{ m}^2 \cdot \text{mol}^{-1}$ | $\text{m}^2 \cdot \text{kmol}^{-1}$ | $\text{l} \cdot \text{mol} \cdot \text{m}^{-1}$; $\text{M}^{-1} \cdot \text{m}^{-1}$ |
| 10^{-4} | | | $\text{cm}^2 \cdot \text{mol}^{-1}$; $\text{ml} \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$ |

Remark 7. $1 (\text{mol}/\text{l})^{-1} \cdot \text{m}^{-1} = 0,001 \text{ m}^2 \cdot \text{mol}^{-1}$
 $1 \text{ m}^2 \cdot \text{mol}^{-1} = 1\ 000 (\text{mol}/\text{l})^{-1} \cdot \text{m}^{-1}$

A substance concentration expressed in mol/l must be converted to the coherent unit mol·m⁻³ (by multiplying the numerical value by 1 000) before calculating the molar absorbance in m²·mol.

Remark 8. Graphs of lg ε or ln κ through the spectrum are the same shape as those of lg A or ln B.

Examples :

- 1) NADH⁸ -- molar lineic absorbance (30 °C, 334 nm) = 618 m²·mol⁻¹
- 2) NADH -- molar lineic absorbance (30 °C, 339 nm) = 630 m²·mol⁻¹
- 3) NADH -- molar lineic absorbance (30 °C, 365 nm) = 350 m²·mol⁻¹

8. Nicotinamide-adenine dinucleotide (reduced).

3. LIST OF MAIN (DECADIC) QUANTITIES

| SECTION | QUANTITY | RELATION | COHERENT SI UNIT | DIMENSION |
|---------|---|---|-----------------------------------|----------------------------------|
| 2.1 | Wavelength | $\lambda = l/N$ $\lambda_1 = \lambda_0/n_1$ | m | L |
| 2.2 | Wavenumber | $\sigma = N/l$ $\sigma = 1/\lambda$ | m ⁻¹ | L ⁻¹ |
| 2.3 | Frequency | $\nu = N/t$ $\nu = E(\Phi)/h$ $\nu = c/\lambda$ | Hz | T ⁻¹ |
| 2.4 | Refractive index | $n = c_0/c_1$ | 1 | 1 |
| 2.5 | Radiant energy | Q | J | L ² M T ⁻² |
| 2.6 | Radiant power | $\Phi = dQ/dt$ | W | L ² M T ⁻³ |
| 2.8 | Transmittance | $\tau = \Phi_{tr}/\Phi_0$ | 1 | 1 |
| 2.9 | Absorptance | $\alpha = \Phi_{abs}/\Phi_0$ | 1 | 1 |
| 2.10 | Reflectance | $\rho = \Phi_{refl}/\Phi_0$ | 1 | 1 |
| 2.11 | Attenuance | $\mu = -\Delta \lg \tau / \Delta l$ | m ⁻¹ | L ⁻¹ |
| 2.12 | Absorbance (if $\alpha = 1 - \tau$) | $A = -\lg (1 - \alpha)$ $A = \lg (1/\tau)$ | 1 | 1 |
| 2.13 | Lineic absorbance | $a = A/l$ | m ⁻¹ | L ⁻¹ |
| 2.14 | Molar lineic absorbance | $\epsilon = a/c$ | m ² ·mol ⁻¹ | L ² N ⁻¹ |

NOTE :
In §2.3 and §2.4 'c' stands for velocity of radiation, in §2.14 for substance concentration.

4. BIBLIOGRAPHY

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CALENDAR OF IUPAC-SPONSORED MEETINGS

1979

| | | |
|---------------------------|--|--|
| May 8-10 | Chemistry Journals and Their Interfaces: An International Seminar for Editors (Prof. G. OURISSON, Institut de Chimie, Université Louis Pasteur, BP 296/R 8, 1 rue Blaise Pascal, F-67008 Strasbourg, France) | Bischofsberg, near Strasbourg (France) |
| May 28-30 | Unesco International Symposium on University-Industry Interactions in Chemistry (Dr. I. ENEBERG, Division of Scientific Research and Higher Education, United Nations Educational, Scientific and Cultural Organization, 7 place de Fontenoy, F-75700 Paris, France) | Toronto (Canada) |
| June 12-16 | VI International Conference on Solid Compounds of Transition Elements (Prof. A. RABENAU, Max-Planck-Institut für Festkörperforschung, Heisenbergstrasse 1, D-7000 Stuttgart 80, Federal Republic of Germany) | Stuttgart (FRG) |
| July 1-6 | XXI Colloquium Spectroscopicum Internationale (Mr. K. M. BILLS, European Research and Development Centre, Inco Europe Ltd., Wiggin Street, Birmingham B16 0AJ, UK) | Cambridge (UK) |
| July 2-5 | V Conference on Modified Polymers, Their Preparation and Properties (Dr. A. ROMANOV, Slovak Academy of Sciences, Dubravska Cesta, Bratislava, Czechoslovakia) | Bratislava (Czechoslovakia) |
| July 9-12 | 19th Prague Microsymposium on Macromolecules: Mechanisms of Degradation and Stabilization of Hydrocarbon Polymers (Dr. P. ČEŤELÍN, PMM Secretariat, Institute of Macromolecular Chemistry, 1888 Petriny, Prague 6, Czechoslovakia) | Prague (Czechoslovakia) |
| July 16-19 | 20th Prague Microsymposium on Macromolecules: Microcalorimetry of Macromolecules (Dr. P. ČEŤELÍN, PMM Secretariat, Institute of Macromolecular Chemistry, 1888 Petriny, Prague 6, Czechoslovakia) | Prague (Czechoslovakia) |
| August 12-18 | VIII International Mass Spectrometry Conference (Dr. O. H. J. CHRISTIE, Laboratory for Mass Spectrometry, University of Oslo, PB 1048 Blindern, Oslo 3, Norway) | Oslo (Norway) |
| August 20-25 | International Conference on Surface and Colloid Chemistry (Prof. S. FRIBERG, Department of Chemistry, 142 Chemistry Building, University of Missouri-Rolla, Rolla, Missouri 65401, USA) | Stockholm (Sweden) |
| August 27-31 | 27th IUPAC Congress (Dr. J. LARINKARI, Kemian Helsinki Keskusliitto, POB 13028, Fabianinkatu 7B, SF-00131 Helsinki 13, Finland) | Helsinki (Finland) |
| August 28-31 | International Symposium on Chemical Education (Mr. P. A. START, Department of Chemistry, University College, Dublin, Republic of Ireland) | Dublin (Ireland) |
| August 30- September 1 | 4th International IUPAC Symposium on Mycotoxins and Phycotoxins (Dr. P. KROGH, Department of Veterinary Microbiology, School of Veterinary Medicine, Purdue University, West Lafayette, Indiana 47907, USA) | Lausanne (Switzerland) |
| September 3-7 | 9th International Conference on Organometallic Chemistry (Prof. P. TIROUFLET, Laboratoire de Polarographie Organique, Faculté des Sciences 'Gabriel', Université de Dijon, 6 Boulevard Gabriel, F-21000 Dijon Cédex, France) | Dijon (France) |

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|--------------------|---|--------------------------|
| September 10-14 | International Conference on Mössbauer Spectroscopy (Dr. D. HANŽEL, J. Stefan Institute, University of Ljubljana, POB 199, 61001 Ljubljana, Yugoslavia) | Portorož (Yugoslavia) |
| September 17-21 | International Symposium on Macromolecules (Prof. R. C. SCHULZ, Organisch-Chemisches Institut, J. J. Becherweg 18-20, D-6500 Mainz, Federal Republic of Germany) | Mainz (FRG) |
| September 17-21 | International Conference on Phosphorus Chemistry 1979 (Prof. G. KEIL, Akademie der Wissenschaften der DDR, Rudower Chaussee 5, GDR-1199 Berlin-Adlershof, German Democratic Republic) | Halle (GDR) |
| September 24-26 | International Symposium on Polymeric Amines and Ammonium Salts –Synthesis, Properties, and Applications (Prof. E. J. GOETHALS, Polymer Chemistry Division, Institute of Organic Chemistry, Rijks-universiteit Ghent, Krijgslaan, 271(S.4 bis), B-9000 Ghent, Belgium) | Ghent (Belgium) |
| December 10-11 | International Symposium on New Horizons in Hydrocarbon Chemistry (Prof. G. A. OLAH, Department of Chemistry, University of Southern California, University Park, Los Angeles, California 90007, USA) | Los Angeles (USA) |
| December 10-14 | XX International Conference on Coordination Chemistry (Prof. D. BANERJEA, Department of Chemistry, Calcutta University, 92 Acharya Prafulla Chandra Road, Calcutta 700009, India) | Calcutta (India) |

1980

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|-------------------|---|--------------------------------|
| February 7-9 | III International Congress on Industrial Waste Water and Wastes (Prof. R. WAGNER, Chemische Abteilung, Institut für Siedlungswasserbau und Wassergütewirtschaft der Universität Stuttgart, Bandtäle 1, D-7000 Stuttgart 80 (Büsnau), Federal Republic of Germany) | Stockholm (Sweden) |
| June 2-6 | V International Conference on Zeolites (Prof. R. SERSALE, Istituto di Chimica Applicata, Facoltà di Ingegneria, Università Degli Studi di Napoli, Piazzale Tecchio, Napoli, I-80125 Italy) | Naples (Italy) |
| July 20-26 | SAC 80: International Conference on Analytical Chemistry (Dr. J. D. R. THOMAS, Department of Chemistry, UWIST, King Edward VII Avenue, Cardiff CF1 3NU, UK) | Lancaster (UK) |
| July 20-27 | VI International Fermentation Symposium (Prof. J. E. ZAJIC, Faculty of Engineering Science, University of Western Ontario, London, Ontario, Canada N6A 5B9) | London, Ontario (Canada) |
| August 17-22 | V IUPAC Conference on Physical Organic Chemistry (Prof. J. F. BUNNETT, Division of Natural Sciences-II, University of California, California, Santa Cruz, California 95064 USA) | Santa Cruz, (USA) |
| September 7-13 | International Symposium on Macromolecules (Prof. F. CIARDELLI, Istituto di Chimica Organica Industriale, Università di Pisa, 35 Via Risorgimento, Pisa, I-56100 Italy) | Firenze (Italy) |
| | III IUPAC Symposium on Organic Synthesis (Prof. B. M. TROST, Department of Chemistry, University of Wisconsin-Madison, 1101 University Avenue, Madison, Wisconsin 53706, USA) | (USA) |

CALENDAR OF NON-IUPAC MEETINGS

1979

| | | |
|--------------------|---|--------------------------------------|
| March 5-8 | III European Symposium on Vitamin B ₁₂ and Intrinsic Factor (Dr. B. ZAGALAK, Chemisches Laboratorium, KISPI, Universität Zürich, Steinweisenstrasse 75, CH-8032 Zürich, Switzerland) | Zürich (Switzerland) |
| March 6-8 | II International Conference on Marine Transportation Handling and Storage of Bulk Chemicals, MariChem 79 (MariChem 79 Secretariat, Gastech Exhibitions Ltd., 2 Station Road, Rickmansworth, Herts. WD3 1PQ, UK) | Monte Carlo (Monaco) |
| March 26-29 | II European Surface Science Conference (ECOSS 2) (Mr. P. M. WILLIAMS, V. G. Scientific Ltd., Imberhorne Lane, East Grinstead, Sussex RH19 2HR, UK) | Cambridge (UK) |
| April 1-6 | International Symposium on the History of Chemical Engineering (Prof. W. F. FURTER, Royal Military College of Canada, Kingston, Ontario, Canada K7L 2W3) | Honolulu, Hawaii (USA) |
| April 2-6 | VI International Vacuum Metallurgy Conference on Special Melting and Metallurgical Coatings (C. F. ELLIOTT, Teledyne - Allvac, POB 759, Monroe, North Carolina 28110, USA) | San Diego, California (USA) |
| April 4-6 | Strength and Structure in Carbons and Graphites (Institute of Physics, 47 Belgrave Square, London SW1X 8QX, UK) | Bath (UK) |
| April 4-6 | III European Conference on Mixing (Organizing Secretary, III Mixing Conference, BHRA Fluid Engineering, Cranfield, Bedford MK43 0AJ, UK) | York (UK) |
| April 9-11 | Kinetics of State Selected Species (Dr. J. P. SIMONS, Department of Chemistry, The University, Birmingham B15 2TT, UK) | Birmingham (UK) |
| April 17-21 | Special Meeting on Enzymes (Dr. B. RIES, Secretariat of Special FEBS Meeting, Laboratory of Biochemistry, Technological Faculty, Pierotijeva 6/VI, YU-41000 Zagreb, Yugoslavia) | Cavtat, Dubrovnik (Yugoslavia) |
| May 13-19 | VI International Congress of Radiation Research (Prof. S. OKADA, Secretary General, VI ICRR, PO Box 152, Bunkyo, Tokyo 113-91, Japan) | Tokyo (Japan) |
| June 24- July 3 | V International Summer Conference 'Chemistry of Solid/Liquid Interfaces' including the Symposium on Interfacial Phenomena in Colloid Systems (Dr. V. PRAVDIĆ, Centre for Marine Research, 'Rudjer Bošković' Institute, POB 1016, YU-41001 Zagreb, Yugoslavia) | Cavtat, Dubrovnik (Yugoslavia) |
| July 8-14 | XI International Congress of Biochemistry (Dr. W. A. BRIDGER, Department of Biochemistry, University of Alberta, Edmonton, Alberta T6G 2H7, Canada) | Toronto (Canada) |
| July 9-13 | II International Conference on the Mechanisms of Reactions in Solution (Dr. J. F. GIBSON, The Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK) | Canterbury (UK) |
| July 23-26 | VI International Symposium on Synthesis in Organic Chemistry (The Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK) | Cambridge (UK) |

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| August 14-23 | XVII General Assembly of International Astronomical Union (Mlle. M. BERGEVIN, BP 130, Succursale Côte-des-Neiges, Montreal, P.Q. H35 2S5, Canada) | Montreal (Canada) |
| August 20-23 | I European Symposium on Organic Chemistry (ESOC 1) (Gesellschaft Deutscher Chemiker, POB 90 04 40, D-6000 Frankfurt/Main 90, Federal Republic of Germany) | Köln (FRG) |
| August 20-25 | International Conference on Surface and Colloid Chemistry (Prof. s. FRIBERG, Department of Chemistry, 142 Chemistry Building, University of Missouri-Rolla, Rolla, Missouri 65401, USA) | Stockholm (Sweden) |
| August 27-31 | II International Congress on Engineering and Food, 'Food Process Engineering 1979' (Dr. J. LARINKARI, PO Box 244, SF-00131 Helsinki 13, Finland) | Espoo, Helsinki (Finland) |
| September 3-7 | V International Symposium on Glycoconjugates (Dr. R. SCHAUER, Biochemisches Institut Christian-Albrechts-Universität, Otto-Meyerhof-Haus, Olshausenstrasse 40-60, D-2300 Kiel, Federal Republic of Germany) | Kiel (FRG) |
| September 3-7 | XIV European Congress on Molecular Spectroscopy (Gesellschaft Deutscher Chemiker, PO Box 90 04 40, D-6000 Frankfurt/Main 90, Federal Republic of Germany) | Frankfurt (FRG) |
| September 10-14 | EUCHEM Conference on Correlation Analysis in Organic Chemistry (Dr. S. CLEMENTI, Dipartimento di Chimica, Università di Perugia, Via Elce di Sotto, I-10-06100 Perugia, Italy) | Assisi (Italy) |

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| July 21-25 | III International Conference on the Organometallic and Coordination Chemistry of Germanium, Tin and Lead (Dr. J. F. GIBSON, The Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK) | Dortmund (FRG) |
|---------------|---|-------------------|

LIST OF ABBREVIATIONS

| | |
|----------|--|
| AOAC | Association of official Analytical Chemists |
| CCPR | Codex Committee on Pesticide Residues |
| CCS | IUPAC Clinical Chemistry Section |
| CEBJ | Committee of Editors of Biochemical Journals |
| CEE | Communauté Européenne Economique |
| CHEMRAWN | IUPAC Committee on Chemical Research Applied to World Needs |
| CIPAC | Collaborative International Pesticides Analytical Council |
| CIPM | Comité International des Poids et Mesures |
| CNIC | IUPAC Commission on Nomenclature of Inorganic Chemistry |
| CNOC | IUPAC Commission on Nomenclature of Organic Chemistry |
| CNRS | Centre National de la Recherche Scientifique (in France) |
| CODATA | ICSU Committee on Data for Science and Technology |
| COGENE | ICSU Committee on Genetic Experimentation |
| COMECON | Council of Mutual Economic Assistance of Communist Nations |
| COWAR | ICSU Scientific Committee on Water Research |
| CQUCC | IUPAC Commission on Quantities and Units in Clinical Chemistry |
| CTC | IUPAC Committee on Teaching of Chemistry |
| CToCCS | IUPAC Commission on Toxicology in Clinical Chemistry |
| ECE | UN Economic Commission for Europe |
| EPQU | IFCC Expert Panel on Quantities and Units |
| FAO | UN Food and Agriculture Organization |
| IARC | WHO International Agency for Research on Cancer |
| ICC | International Association for Cereal Chemistry |
| ICSU | International Council of Scientific Unions |
| ICSU AB | ICSU Abstracting Board |
| IDCNS | IUPAC Interdivisional Committee on Nomenclature and Symbols |
| IFCC | International Federation of Clinical Chemistry |
| IIASA | International Institute for Applied Systems Analysis |
| ISO | International Organization for Standardization |
| ISO/TC | ISO Technical Committee |
| IUB | International Union of Biochemistry |
| IUFoST | International Union of Food Science and Technology |
| IUPHAR | International Union of Pharmacology |
| JCBN | IUB-IUPAC Joint Commission on Biochemical Nomenclature |
| MAB | Man and Biosphere Programme |
| MARC | Monitoring and Assessment Research Centre |
| NC-IUB | Nomenclature Commission of IUB |
| PAC | <i>Pure and Applied Chemistry</i> , official Journal of IUPAC |
| PNA | Appendix on Provisional Nomenclature, Symbols, Terminology, and Conventions to IUPAC <i>Inf. Bull.</i> |
| Red Book | IUPAC Rules on Nomenclature of Inorganic Chemistry |
| SAIC | IUPAC Subcommittee for Assessment of Isotopic Composition |
| SCOPE | ICSU Scientific Committee on Problems of the Environment |
| SCOR | ICSU Scientific Committee on Oceanic Research |
| UCLA | University of California at Los Angeles |
| UN | United Nations |
| UNEP | United Nations Environment Programme |
| UNESCO | UN Educational, Scientific, and Cultural Organization |
| UNISIST | UNESCO-ICSU Programme on International Science Information System |
| WHO | UN World Health Organization |

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